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PROCEEDINGS

OF THE

AGRICULTURAL CONFERENCE

HELD IN THE

DEPARTMENT OF REVENUE AND AGRICULTURE.

AT

SIMLA

ON THE

2nd, 3rd, 4th, 5th, 6th, and 7th October 1893.

WITH APPENDICES.

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Resolutions passed at the Agricultural Conference.

Second Meeting.

The Botanical Department.

Resolution I.—That while acknowledging the advantage gained in bringing the whole of India under the investigation of the Botanical officers in the country, the Conference are of opinion that under the system in force insufficient importance has been attached to agricultural botany, and recommend that more special attention should be directed in future to plants connected with agriculture.

Agricultural Entomology.

Resolution II.—That the investigation of animal and insect pests injurious to agriculture is necessary. The work done in this direction by the officer on the Indian Museum staff in connection with agricultural entomology is appreciated. The investigation would, however, be more effectually carried out if the investigating officer were given the opportunity of personal communication with the officials and others in provinces who could co-operate with him.

District Analysis.

Resolution III.—That where practicable, agricultural statistics should be compiled by the village officers or agency for every village or estate in each province.

Resolution IV.—That where such are compiled, some system should be adopted under which the leading facts and statistics indicating the agricultural condition of the village or estate for each year should be abstracted in a simple form.

Resolution V.—That these forms should be brought together in a special volume to be maintained for each administrative circle, *e.g.*, Revenue Inspector's Circle, pargana, etc., in which District Officers should from time to time enter remarks, if required, on progress or degradation of the village or circle.

Resolution VI.—That some system should be established ensuring that the information contained in the forms shall be utilized by the District authorities.

Resolution VII.—That it should be the special duty of the Agricultural Department to ascertain from time to time by inspection that the forms are properly maintained and efficiently utilized for each district.

Resolution VIII.—That the district analysis contemplated by the Government of India Resolution of 1881 will be effectually provided for by the settlement reports and records, supplemented by the annual abstracts of village statistics. But that it will be also useful that the Agricultural Departments should collate and publish, or encourage the collation and publication, from time to time, of general information and statistics showing the agricultural condition of each district, either in short abstracts or in such volumes as the Statistical Atlas of Bombay, or where statistics are not available, such reports as those of Mr. Sen's and Mr. Basu's on the Dacca and Lohardugga districts in Bengal.

Resolution IX.—That it is very desirable that the Director of Agriculture should take advantage of the knowledge gained by his periodical inspections to bring to the notice of the Revenue authority any cases of local deteriorations which seem to require special action or enquiry.

Resolution X.—That when the information obtained through the village or circle books is sufficient to establish serious deterioration or depression in any villages or tracts, the information should be communicated to the Director through such channel as the Local Government may direct, with the view of his suggesting remedies for the consideration of District Officers or such Revenue authorities as the Local Government may direct.

Third Meeting.

Agricultural Assistants and Experts.

Resolution I.—That, in the opinion of the Conference, it is essential in the interests of agricultural improvement that there should be in each province a highly trained technical assistant to the Director of Agriculture, and that unless or until natives sufficiently well trained and qualified are available, he should be a European expert.

Resolution II.—That there should be a subordinate staff of native experts employed for the purposes indicated in Dr. Voelcker's conclusions and for superintending farms and agricultural experiments.

Resolution III.—That native experts should be trained in this country, not in England.

Resolution IV.—That the training should be not inferior to that given at Cirencester.

Resolution V.—That the range of pay for subordinate native experts should be not less than that of the appointments open to revenue officials who may ordinarily expect to rise to the higher grades of Tahsildars or Mamlatdars.

Resolution VI.—That the native experts should as rarely as possible be transferred to other departments.

Fourth Meeting.

Construction of dams and bunds.

Resolution I.—That the Government of India be invited to circulate separately the papers submitted to the Conference on this subject.

Resolution II.—That the subject be taken under special consideration by the departments in those Provinces where the local conditions might require it.

Arboriculture.

Resolution III.—That the Government of India be invited to draw the further attention of the Local Governments to the subject of roadside arboriculture.

Formulæ for the division of mixed crops.

Resolution IV.—That the system proposed in the Government of India Circular No. 50-80, dated 16th August 1893, should be recommended; that no mixtures should be shown as such in the return sent to the Central Provincial office; that in district returns they should be divided into their constituent parts either initially by the village officers or subsequently by the district staff in such methods as may be arranged on the advice of the Director of Agriculture.

Form of Agricultural Department Reports.

Resolution V.—That the Conference approve generally of the principles laid down in the Government of India Circular Nos. 54 A, dated 28th April 1884, and 52 G, dated 14th September 1887.

Resolution VI.—That the Government of India be invited to make suggestions on this subject, and that at any future conference at which Dr. Voelcker's recommendations might be gone into in greater detail, the headings of the reports should be definitely revised.

Price Statements.

Resolution VII.—That so far as Military requirements are concerned, it seemed desirable that the Military Department should itself take steps, by committees or otherwise, to ascertain correct prices of articles in the price of which they are interested.

Resolution VIII.—That the system under which certificates of prices are furnished by the District Officers to the Military authorities for other purposes than determining compensation for dearness of provisions and fodder should be abolished.

Resolution IX.—That the fortnightly price returns are required by District Officers mainly for assessment purposes; that for these purposes they are sufficiently accurate, that the appointment of inspectors even at the cost of the Military Department to see after the correctness of some or all of these returns is unnecessary, and that the existing agency for the preparation and inspection of these returns is sufficient if properly worked.

FIFTH MEETING.

Education.

Resolution I.—That in considering the question of agricultural education and progress, the Conference desire to express the opinion that it is most desirable to extend primary education among the agricultural classes.

Resolution II.—That, as a general rule, instruction in agriculture should be combined with the existing course of education, and not depend exclusively on separate special institutions.

Resolution III.—That it is most desirable that the Universities should recognize the Science of Agriculture as an optional subject in the course for a degree.

Resolution IV.—That it is very desirable that the elementary principles of agriculture should form a prominent subject in the education which is given in village schools with the view of creating more interest in agricultural improvement amongst the cultivating classes.

Resolution V.—That in order to secure the object of the last resolution, it is desirable to take early steps to provide suitable teaching, the best books and "readers."

Resolution VI.—That it is highly desirable that the claims of men trained in scientific agriculture to appointments in the Revenue and cognate Departments should be as freely recognised as those of men trained in Law, Arts, and Engineering.

Resolution VII.—That where appointments in the Revenue or cognate Departments are made on the result of the competitive examinations, scientific agriculture should be included as an optional or necessary subject in the examination course.

Resolution VIII.—That in any province in which it may be determined to introduce a scheme for higher agricultural education, no arrangements will be satisfactory which do not provide (1) for a thoroughly practical training of the students in the field and laboratory as distinct from theory or practice as taught in the lecture room, and (2) for examination tests of a special and searching character in the above branches of work.

Resolution IX.—That, in the opinion of the Conference, education in the lower schools should be of such a practical character as to fit the pupils for technical pursuits including agriculture, as well as for literary and commercial pursuits.

Resolution X.—That the text-books used in schools should be written in the simplest language ordinarily understood by the people, and should be descriptive of subjects with which they are familiar; also that the use of pictorial lesson charts, illustrating familiar objects, should be encouraged.

Resolution XI.—That the system of training in normal schools should be adapted to qualify school teachers to give instruction of the character indicated in Resolution VIII.

Resolution XII.—That in each Province a Committee, in which agricultural officers should be included, should be convened at an early date for the consideration of the questions raised in the preceding resolutions.

SIXTH MEETING.

See the Proceedings.

Proceedings of the Agricultural Conference.

The following attended the Conference :—

India . . .	Sir E. Buck, Kt., C.S.I., Secretary to the Government of India, Department of Revenue and Agriculture. Dr. J. W. Leather, Agricultural Chemist to the Government of India.
Madras . . .	Mr. H. F. Clogstoun, C.S.I., 3rd Member, Board of Revenue, Commissioner of Revenue Settlements and Director of the Department of Land Records and Agriculture, Madras. Mr. F. A. Nicholson, Collector, South Arcot.
Bombay . . .	Mr. E. C. Ozanne, Survey Commissioner and Director of the Department of Land Records and Agriculture, Bombay.
Bengal . . .	Mr. W. C. Macpherson, Offg. Director of the Department of Land Records and Agriculture, Bengal.
N.-W. P. & Oudh .	Mr. J. O. Miller, Director of the Department of Land Records and Agriculture, North-Western Provinces and Oudh.
Punjab . . .	Mr. E. B. Francis, Director of the Department of Land Records and Agriculture, Punjab. Mr. J. Wilson, Deputy Commissioner, Shahpur. Mr. J. M. Douie, Secretary to the Punjab Government, Revenue Department.
Central Provinces .	Mr. J. B. Fuller, C.I.E., Commissioner of Settlements and Agriculture, Central Provinces.
Assam . . .	Mr. H. Z. Darrah, Director of the Department of Land Records and Agriculture, Assam. Mr. E. A. Gait, on special duty.
India . . .	Mr. E. D. Maclagan, Under-Secretary to the Government of India, Department of Revenue and Agriculture, Secretary to the Conference.

Invited to certain meetings.

Veterinary Lieutenant-Colonel J. H. B. Hallen, C.I.E., Inspector General, Civil Veterinary Department.
Mr. R. Ribbentrop, C.I.E., Inspector General of Forests.
Mr. E. Thurston, Offg. Reporter on Economic Products to the Government of India.
Veterinary Captain J. Mills, Principal, Bombay Veterinary College.
Prof. T. H. Middleton, Professor of Agriculture, Agricultural College, Baroda.
Captain F. C. Chapman, Proprietor, Banti Estate, Bharwari, Oudh.

First Meeting, Monday, 2nd October 1893.

Opening Address.

1. The Conference met on Monday, the 2nd October, at 3 P.M. A proof copy of the President's proposed address was presented to each member with a request that as the address was to be published as an intimation to the public of the general plan to be adopted in connection with agricultural improvement, he would offer criticisms of any portion of the draft. The address was further considered at the second meeting of the Conference. *Opening Address.*

(i) Agricultural Ledger Series.

2. *The President* explained the system of the Ledger Series. The system of ledgering from official records was successfully elaborated by Dr. Watt in the compilation of the Dictionary of Economic Products. The further measure of publishing information in a series of leaflets or bulletins, each devoted to one subject, was introduced by the Madras Agricultural Department. The two systems have been now combined in the Imperial Secretariat. All information which comes to hand in connection with Economic Products or Agriculture and which is worth recording is ledgered in the office either of the Reporter on Economic Products or of the Agricultural Chemist, and any notes or papers of sufficient interest for general publication are published in full or in abstract in *Agricultural Ledger Series.*

Agricultural Ledger Series—contd.

a series of bulletins designated the "Agricultural Ledger Series." Provincial Departments of Agriculture have been invited in Circular No. 31, dated 19th August 1892, to communicate for inclusion in the series any information of general and not of purely local interest. The Bulletin when not reproducing the communicated paper in full contains reference to the source from which it was derived or to papers which can be referred to or obtained if required. This system does not interfere with any Local Government maintaining a similar local series.

3. The Conference was invited to express its views as to the publication above described, and the *President* observed that unless the Provinces desired to co-operate, the plan could not be successfully carried out. The members were unanimously of opinion that the system was an extremely good one, and general co-operation was promised. *The President* expressed satisfaction at this decision, and invited the members to arrange for the communication of matter for the Ledger Series whenever they thought that the results of local enquiry were worthy of dissemination to other provinces.

4. The following matters of detail came also under discussion :—

Mr. Fuller urged that Bulletins consisting of abstracts of reports submitted by local Directors of Agriculture and Land Records should be sent in proof to the contributing officer, before publication, in order to ensure that the information had been fully and correctly recorded. This suggestion met with approval.

He further pointed out the advisability of giving a serial number to the main heads by the addition of the words "No. — of———" before the words "Main head." This was agreed to, its object being to check the completeness of the Series.

Mr. Macpherson proposed that an index should be prepared annually and annually revised and brought up to date. The index should show alphabetically the subjects and sub-heads of the Ledger Series with reference to the main head, so that all information on any particular subject might be readily ascertained. The suggestion was approved.

A note by Mr. Macpherson on the subject of the Ledger Series will be found in Appendix No. III.

Second Meeting, Tuesday, 3rd October 1893.

(ii) The President's Address.

The President's Address.

5. The President's address* was read and placed finally on the table. The Proceedings opened by a discussion on the address.

6. *Mr. Clogstoun* stated that it was not quite clear from the President's address whether he was opposed to the institution of experimental farms as a means of prosecuting agricultural enquiry. So far as Madras was concerned he would desire to see the proposed experimental farms, the establishment of which had been for a long time deferred in deference to the wishes of the Government of India, at once started. Careful experiments of the nature suggested by Dr. Voelcker would be made on these farms by scientific experts, and any improvements found from time to time suitable for introduction might be at once introduced. There was no great need in Madras for further enquiry in view to the elaboration of agricultural statistics, or to determine the tracts in which agriculture was below a fair standard of efficiency. The main cause of failure in the harvests of the Presidency was the failure in the periodical rains, and the tracts most liable to this failure were all well known. Great efforts were being made to give these tracts some protection against drought by making liberal advances for the construction of wells.

7. *Mr. Fuller* recommended that enquiry should be 'special' rather than 'general.' He thought that more practical utility would result from detailed investigations into particular conditions or processes than from a general

* Appendix No. II.

enquiry into the agricultural circumstances of a tract. He alluded to the more or less successful results which had followed Mr. Mollison's experiments with potato culture to combat a serious disease in potatoes in Poona, and thought that the example should be followed. *The President's Address—contd.*

8. *Mr. Wilson* hoped that the public would be fully informed as to what had been or was being done in the way of agricultural improvement, whether as regards canals and communications and general measures of that kind, or as regards more positive and detailed action, such as the distribution of seed, etc.

9. Notes showing the progress which has taken place in agricultural improvement in the Punjab and Bengal will be found at pages 35-39.

(iii) Scientific Departments.

10. The subject of enquiry by Scientific Departments was then discussed. The Conference accepted the principles that scientific investigation must be conducted under Government direction, in view of the fact that the education of the people had not reached a stage at which they would take it up independently, and they also agreed that such investigation must be, in most cases, of a national rather than of a provincial character. *The President* laid upon the table a diagram showing the various departments of investigation whose work was directly or indirectly connected with the scheme of agricultural enquiry and improvement, and proposed that the work done or to be done by each should be brought under brief discussion. *Scientific Departments.*

11. (*1*) *The Survey Department.—The President* stated that the Imperial Department had in all Provinces outside the Madras and Bombay Presidencies, which had their own Survey Departments, been brought into connection with the general scheme of agricultural enquiry by co-operating with the Provincial authorities in training village establishments, and in carrying out cadastral surveys to be maintained hereafter by the trained village officials. Field maps maintained by local agency must always be the basis of all systematic agricultural enquiry, and the work that had been done by the Survey Department in recent years in the required direction had been most valuable. Their chief fields of labour had been certain districts in the North-Western Provinces, the whole of the Central Provinces, Burma and Assam. They had now entered on a new field in Bihar. The change which had, with the loyal co-operation of the officers of the Department, been effected was the utilization of village establishments, a new departure made since the Famine Commissioners' report was written, with the object of securing the continuous maintenance of village maps and records, without which, as already remarked, no system of agricultural enquiry could be properly kept up.

It was generally agreed that the Survey Departments in all Provinces had done most useful work in laying the foundation for agricultural investigation and enquiry.

12. (*2*) *The Geological Department.—The President* explained that at one time the researches of the Department were confined almost entirely to scientific survey. Scientific survey was no doubt of great importance even to agriculture, as providing a basis for the proper comprehension of the soils of the country. A change, however, had been made in recent years by the restriction of one section of the Geological Department to more practical investigation, mainly in connection with coal, petroleum and iron. These researches are only indirectly connected with agriculture, but will tend, so far as they are successful, to bring about the introduction of manufactories upon which the improvement of agricultural implements and the extension of agricultural works depends. Already the iron-works at Barakar and Roorkee have been of service in connection with Canal works.

On the other hand, the responsibility rests upon the Agricultural Departments to carry out the Famine Commission's recommendation to foster other industries than agriculture, and nothing will tend more to this end than the development of coal and of the mineral resources of the country. It would be desirable that the Agricultural Department in each Province should

Scientific Departments—contd.

be in communication with the Geological Department and should co-operate with that Department in guiding the researches of the geological experts.

Mr. Nicholson observed that in some countries in Europe the Agricultural Department dealt with industries not connected indirectly as well as directly with agriculture. For instance, at Wurtemburg there was a Bureau of Industries under the Agricultural Department which dealt with rural industries, such as the cottage linen industry, etc. The same thing was done in Italy.

The Conference were of opinion that the Geological Department had now begun to do good work in a practical direction; that its investigations should receive the attention of Agricultural Departments, who should co-operate in the development of geological investigations directly or indirectly useful to agriculture.

13. (*3*) *The Botanical Department.—The President* stated that more scientific investigation had been done in the Botanical than in any other field. This was due partly to its being a favourite subject at the beginning of the century, especially in the case of medical men, who in earlier days were the only scientific experts in the country. A recent improvement had been made in the system of Botanical research which was a few years ago confined to three Provinces by dividing the whole of India amongst the existing Botanical officials, four in number, so as to bring all India under a Botanical Survey.

Mr. Fuller represented that systematic Botany was being extensively worked out in the hill regions, but that very little was done in the cultivated plains. *Dr. Leather* suggested that more should be done on the physiological side. After discussion *Mr. Fuller* submitted the following Resolution, which was carried unanimously :—

"That while acknowledging the advantage gained in bringing the whole of India under the investigation of the Botanical officers in the country, the Conference are of opinion that under the system in force insufficient importance has been attached to agricultural botany, and recommend that more special attention should be directed in future to plants connected with agriculture."

14. (*4*) *Economic Products Department.—The President* explained that existing information about economic products had been collated in Dr. Watt's Dictionary—a work of ten years,—and that the Reporter on Economic Products was now engaged in developing further investigation. In reply to *Mr. Nicholson*, who asked whether any arrangement was or could be made for sending to England products which were worth attention, he explained that a system was now organized in co-operation with the authorities of the Imperial Institute under which products of the class alluded to would be annually sent to England for investigation. *Mr. Thurston* stated the services of Dr. Theodore Cooke, late Principal of the Poona College of Science, had been specially engaged at the Institute for this purpose. *The President* added that although the Institute had not been initiated or specially promoted by the Government of India, yet it was thought that as it had to a large extent been supported by Indian contributions, it should be utilized as far as possible for the benefit of India, and that it could be best made use of by being employed for the scientific examination of products likely to be useful to commerce.

15. (*5*) *Civil Veterinary Department.—The President* explained that the Department itself was new, and that the starting of veterinary establishments in each Province must, apart from the steps taken to introduce a more rational treatment of disease and to check the ravages of cattle epidemics, lead to the collection of much information useful to agriculture. Systematic and scientific enquiry is already being taken up under a special branch of the Department, and includes not only investigation as to the various breeds of cattle and the like, but also bacteriological research and a thorough investigation into the diseases of cattle and the means of coping with their diseases. As the subject was fully dealt with in recent Resolutions of the Government of India, he need not pursue it further. *Mr. Nicholson* observed that the money spent on these investigations ought to prove a useful investment. The Conference generally agreed that satisfactory measures had been taken to secure research in this field.

16. (6) *Entomological research.*—The President explained what had been done by Mr. Cotes of the Indian Museum with the permission of the Trustees in this direction, and intimated that if money could be found for the purpose, the Trustees would be doing a useful work in permitting the official responsible for entomological research to travel. *Scientific Departments*—contd.

Mr. Darrah stated that the Assam planters were already showing their appreciation of Mr. Cotes' work by following his instructions for protecting their crops against insect pests; forwarding specimens of insect pests and offering a prize for an essay on the subject. The Chief Commissioner had increased the value of the prize by 50 per cent. and Mr. Cotes had been asked to adjudicate.

Both *Mr. Francis* and *Mr. Ozanne* spoke in favour of the series of Lesson Sheets issued by Mr. Cotes, and had advised their introduction into schools. They hoped, as did other members of the Conference, that they would be continued.

Mr. Fuller urged strongly that the officers entrusted with the duty of entomological research should be allowed to travel. It would be much more satisfactory that they should see insect pests on the crops, and personally examine the conditions under which damage was done by them on the spot, than that they should merely receive specimens at the Central Museum. After further discussion the Conference passed the following Resolution:—

That the investigation of animal and insect pests injurious to agriculture is necessary. The work done in this direction by the officer on the Indian Museum staff in connection with agricultural entomology is appreciated. The investigation would, however, be more effectually carried out if the investigating officer were given the opportunity of personal communication with the officials and others in Provinces who could co-operate with him.

(iv) District Analysis.

17. *The President* referred to the discussions and resolutions at the last Conference, and stated that, although the subject had been then fully dealt with, a great deal remained to be done in the way of systematic investigation. "District analysis" meant the ascertainment of the conditions and circumstances in each agricultural tract, and the consequent ascertainment of defects in the system of environments of agriculture in each with the view to the prevention, cure, or removal of such defects. *District Analysis.*

18. It was satisfactory to know that in almost every Province, village or circle books were now kept in which the continuous record of agricultural vicissitudes in each village would be maintained. This plan would lead ultimately to a very accurate determination of the conditions and requirements of each agricultural tract. What was now wanted was that Directors of Agricultural Departments should keep the Local Governments informed whether the record was continuously maintained as it should be, and *Mr. Fuller* added that Directors should also be responsible for drawing attention to any circumstances coming to their notice which indicated the existence of agricultural depression and hardship requiring immediate remedy.

19. After much discussion the Conference agreed that the six Resolutions passed at the seventh Meeting of the last Conference should be adopted, and that two, numbered VII and VIII below, should be added. The Resolutions passed were accordingly as follows:—

I.—"That where practicable, agricultural statistics should be compiled by the village officers or agency for every village or estate in each province.

II.—"That where such are compiled, some system should be adopted under which the leading facts and statistics indicating the agricultural condition of the village or estate for each year should be abstracted in a simple form.

III.—"That these forms should be brought together in a special volume to be maintained for each administrative circle, e.g., Revenue Inspector's circle, pargana, etc., in which District Officers should from time to time enter remarks, if required, on progress or degradation of the village or circle.

IV.—"That some system should be established ensuring that the information contained in the forms shall be utilized by the District authorities.

V.—"That it should be the special duty of the Agricultural Department to ascertain from time to time by inspection that the forms are properly maintained and efficiently utilized for each district.

District Analysis—contd.

VI.—"That the district analysis contemplated by the Government of India Resolution of 1881 will be effectually provided for by the settlement reports and records, supplemented by the annual abstracts of village statistics. But that it will be also useful that the Agricultural Departments should collate and publish, or encourage the collation and publication from time to time, of general information and statistics showing the agricultural condition of each district, either in short abstracts or in such volumes as the Statistical Atlas of Bombay, or where statistics are not available, such reports as those of Mr. Sen's and Mr. Basu's on the Dacca and Lohardugga Districts in Bengal.

VII.—"That it is very desirable that the Director of Agriculture should take advantage of the knowledge gained by his periodical inspections to bring to the notice of the Revenue authority any cases of local deteriorations which seem to require special action or enquiry.

VIII.—"That when the information obtained through the village or circle books is sufficient to establish serious deterioration or depression in any villages or tracts, the information should be communicated to the Director through such channel as the Local Government may direct, with the view of his suggesting remedies for the consideration of District Officers or such Revenue authorities as the Local Government may direct."

A note by Messrs. Darrah and Gait with reference to resolutions II and III will be found below in Appendix III at page 39.

(v) Agricultural Gazetteer.

Agricultural Gazetteer.

20. Some discussion followed as to the manner best suited for bringing together existing information regarding agricultural methods and conditions. It was originally suggested that an Imperial Officer, the Agricultural Chemist, should be employed in collecting information from original records and reports, but objections were made to the effect that this would cause considerable waste of valuable time, and that these records and reports could not always be trusted, and required correction by persons possessing local knowledge. It was, therefore, determined that the work should be taken up by the Provincial authorities, *e.g.*, the Directors and Assistant Directors, and that the Imperial Officer should compile the results. It was further settled that it would be convenient instead of instituting a general enquiry all at once, that different subjects should by degrees be taken up and dealt with separately, and that in determining the order in which such subjects should be taken up, priority should be given to matters in which early improvement may be expected.

Mr. Macpherson communicated a note on this subject by Mr. Basu, which will be found in Appendix III (page 40).

Reference is invited to paragraphs 4 and 5 of Mr. Ozanne's Note No. 12 on page 43 with which the Conference generally agreed.

Third Meeting, Wednesday, 4th October 1893.

(vi) Agricultural Assistants and Experts.

Agricultural Assistants and Experts.

21. In connection with the institution of organized enquiry into existing methods and conditions of agriculture, the following "conclusions" recorded by Dr. Voelcker in paragraph 412 of his report were read:—

"*Before* any real *improvement can be effected* in agriculture, the institution of *organized enquiry* into existing methods and conditions *is absolutely necessary.* Thus far, little more has been done than to collect statistics and information as to the liability of districts to famine. The expressed opinions of the Famine Commissioners and of the Government of India have clearly indicated that more than this was intended, and that enquiry into agricultural practices was recognized as a preliminary to agricultural improvement. The time has now arrived when practical agricultural enquiry should be initiated. The principal directions in which enquiry should proceed are, firstly, the obtaining of definite information as to the requirements of each district in the matter of supply of water, manure, wood, and grazing; secondly, the study of agricultural practices, with a view to the transference of the better methods to districts where they are not known.

"The *agency* which Agricultural Departments possess *at present is inadequate* to carry out such a system of enquiry, and a technical knowledge of agriculture is a necessity.

"The Directors of Departments of Land Records and Agriculture are principally occupied with administrative duties, and have neither the time nor the technical acquaintance with agriculture which would enable them to devote themselves to the subject of agricultural improvement. Further, the constant changes in the tenure of the office of Director prevent the continuity of any experimental enquiry.

"While, for administrative reasons, it is desirable to retain the Director of an Agricultural Department in his present position, the want of technical knowledge of agriculture must be supplied; this can best be done by associating with the Director one or more expert Assistants who will make agriculture the business of their lives and whose duty it will be to investigate, under the Director's orders, the agricultural conditions of the different districts of a Province. The men selected as agricultural experts should be, by preference, Natives who have been trained in India." *Agricultural Assistants and Experts*—contd.

22. The question raised by Dr. Voelcker as to the subordinate agency to be employed in the enquiry was brought forward. It was generally agreed that that some trained expert or experts must form part of the agricultural staff in every Province, both for the purpose indicated in the "conclusions" above-quoted and for the supervision of experimental farms.

The expert staff now existing in each Province is the following:—

Bengal	one officer on ₹ 300 p. m. and 2 on ₹ 250.
Madras	one officer on „ 750—50—1,000, one on „ 200—10—250 and four on „ 50—20—150.
Bombay	one officer on „ 500—50—700.
North-Western Provinces	one officer on „ 400—500.
Central Provinces	one officer
Panjab, Assam, Burma	None

(Notes prepared by some of the members of the Conference on the agricultural staff, existing and required, in their respective provinces will be found in Appendix No. III, pages 41 to 43.)

23. The character of the staff to be employed and the nature of the training to be adopted were then fully discussed. The following conclusions were arrived at.

24. It was generally agreed that, at any rate in the larger Provinces, which could afford it and in which agricultural enquiry and experiment were especially needed, there should be, unless and until native experts are available, at least one European expert highly trained in practical and scientific agriculture; that native experts should, as suggested by Dr. Voelcker, be trained in this country, not in England; and that the training should not be inferior to that at Cirencester. So far as the native experts to be employed are concerned, the number required in each Province will not be large. For the present the number in any Province would not exceed four or five, although in some Provinces it was hoped to work up eventually to the provision of one such official for each district.

25. The question of the pay to be accorded to native experts was discussed. It was the unanimous opinion of the Conference that trained students, once admitted to the agricultural staff, should as rarely as possible be transferred to other departments in view of the fact that each year's experience added to their value as agricultural experts. That the pay to which they can eventually rise should not therefore be less than that of the higher grades of such revenue officials as Tahsildars and Mamlatdars,—*e.g.*, about ₹250. That the minimum or initial pay must be left to Local Governments to decide, provided that the principle be observed that the general scale of pay should be as attractive as that offered to revenue officials who have the opportunity of rising to the offices above indicated.

26. It was admitted that education of the Cirencester standard, which would involve a course of three or four years, could not without undue cost to the State be supplied in every Province, and that the policy should be adopted of establishing a Central Agricultural College where a diploma of the Cirencester standard could be obtained on the principle followed in connection with education in Forestry and Veterinary Science. The Forest School at Dehra now includes pupils from every Province except Bombay, and it is contemplated that the Bombay Veterinary College is to be the only College at which Veterinary diplomas of the highest class are to be given.

27. The two Provinces in which agricultural education of a high standard has been introduced are Madras and Bombay. The Inspector General of Forests suggested that if a Central Agricultural College is established at Poona, the

Agricultural Assistants and Experts—contd.

Bombay Government should be invited to agree that the national Forest Institution at Dehra should be utilized by the Bombay Presidency. The suggestion as regards the utilization of the Poona College for Agricultural Education was agreed to generally, and the Bombay delegate, *Mr. Ozanne*, saw no reason why the proposal as regards Dehra should not be laid before the Bombay Government.

28. As regards the maintenance of other agricultural training schools of a high class in Madras or any other Province, it was considered that the question seemed to turn on that of the possibility of utilizing the trained students in administrative appointments. There was no other opening worth considering for trained agricultural students. In the Madras Presidency, *Mr. Clogstoun* stated, no special advantages in the competition for subordinate revenue appointments were held out to passed students of the local Agricultural College, and indeed under rules recently passed by the Madras Government which restricted to graduates the right to appear for the Revenue Higher Test examination,—an examination which must be passed by all applicants for the post of Deputy Collector, and which will, it is believed, be practically the test for tahsildars,—all hope of entering the higher branches of the Revenue service is cut off from students of the Agricultural College. The hardship of the rule, however, as regards students of the College has been admitted, and the Madras Government has decided to invite the Senate of the University to consider the propriety of instituting a general science degree or a special degree in agriculture in view to this last degree, or the general science degree *plus* a diploma in agriculture, being allowed to qualify for entrance to the Revenue Test Higher grade.

Agricultural students could be prepared for the science degree or the degree in agriculture while studying at the Agricultural College, and there is every reason to hope that a considerable number of paying students would elect to enter the Agricultural College and to read for these degrees in preference to studying for the degree in Arts.

29. It was agreed that the question be further discussed when the subject of agricultural education was brought forward. In the meantime the following Resolutions were passed :—

(*1*) *That in the opinion of the Conference it is essential in the interests of agricultural improvement that there should be in each province a highly trained technical assistant to the Director of Agriculture, and that unless or until natives sufficiently well trained and qualified are available, he should be a European expert.*

(*2*) *That there should be a subordinate staff of native experts employed for the purposes indicated in Dr. Voelcker's conclusions and for superintending farms and agricultural experiments.*

(*3*) *That native experts should be trained in this country, not in England.*

(*4*) *That the training should be not inferior to that given at Cirencester.*

(*5*) *That the range of pay for subordinate native experts should be not less than that of the appointments open to revenue officials who may ordinarily expect to rise to the higher grades of Tahsildars or Mamlatdars.*

(*6*) *That the native experts should as rarely as possible be transferred to other departments.*

Fourth Meeting, Thursday, the 5th October 1893.

30. *The President* introduced to the meeting Captain Chapman, the owner of an estate at Banti in Oudh, who had been nearly 50 years in the country and had much interested himself in agricultural matters. Any questions which he might bring forward deserved the consideration of the Conference in view of the fact that Captain Chapman had personally received Dr. Voelcker and Dr. Leather on his estate and had given them much valuable information based on the practical experiments which he had for some years been engaged in carrying out. Captain Chapman's estate was in fact an experimental farm conducted without cost to the State, and afforded a useful example which might well be followed by other educated and intelligent landowners.

(vii) Construction of Dams and Bunds.

Construction of Dams and Bunds.

31. The first subject on the table for discussion was that of the construction of dams and bunds for (*a*) the prevention of erosion, and (*b*) the fertilization of land by deposit of silt. Captain Chapman had devoted much attention to this subject and the matter had been taken up in a Circular No. 23, dated 21st June 1893, in which information was asked for regarding action taken during recent years and the practices prevailing among agricultural classes.

The evidence in the replies to the Circular indicated that in many provinces the practice of fertilizing agricultural land with silt was not uncommon, especially in Madras, the Central Provinces, Bengal, and parts of the Punjab and Bombay. On the other hand, the fertilizing silt in many rivers was not utilized, notably in the case of rivers issuing from the Himalayas.

As regards the prevention of erosion by drainage and the reclamation of land at the heads of ravines, evidence was brought forward that in the Shahpur district of the Punjab and on Captain Chapman's Estate in Oudh experiments in this direction had been carried out and had proved remunerative. In the first case worthless land so reclaimed was found to be worth R100 an acre or more; in the second the cost was R100 an acre and the rent of the reclaimed land R10 an acre. In view of the extensive and serious deterioration of agricultural land due in some provinces to drainage erosion, the Conference considered the subject of importance. *Captain Chapman* suggested that the reclamation of ravine land would be a useful famine work, and *Mr. Miller* stated that it was included in the list of famine works in the North-Western Provinces. *The President* also stated that it had been recommended by the Government of India, but that the system could not be adopted in time of famine unless it had been previously worked out in a practical manner by experiment. This conclusion was accepted.

Mr. Ribbentrop drew attention to the necessity for diminishing the damage done by ravines and sandy torrents in the Sub-Himalayan tracts by proper afforestation of the head waters and subsequently furnished a note on the subject. (*Vide* Appendix III, page 46.)

32. Resolved:

(*1*) *That the Government of India be invited to circulate separately the papers submitted to the Conference on the subject.*

(*2*) *That the subject be taken under special consideration by the Departments in those Provinces where the local conditions might require it.*

(viii) Remunerative Arboriculture.

Remunerative Arboriculture.

33. The question of remunerative arboriculture was then discussed at the instance of *Captain Chapman*, who represented that very often the wrong class of trees was planted along the roads, and that many trees producing either fruit and timber could be planted which would yield an assured income of 8 annas a tree. *Mr. Wilson* noticed that a considerable income was derived by the District Board of his own district from a careful system of arboriculture, and *the President* drew attention to the advantage of planting fodder trees and of throwing open the grazing on such trees in times of famine. He stated that the subject was one which had received considerable attention in recent years.

34. Resolved:

That the Government of India be invited to draw the further attention of the Local Governments to the subject of roadside arboriculture.

(ix) Mixed Crops.

Mixed Crops.

35. The next subject for discussion was the manner in which mixed crops should be returned in the Agricultural Statistics. The method proposed in the Government of India's Circular Nos. 50—80, dated 16th August 1893, was the following:—

"Important 'mixtures' such as 'wheat and barley' will be entered in the village registers as 'mixtures,' no attempt being made by the village officers themselves to separate the areas of the component crops. The subdivision of areas will be made in the central offices on for-

Mixed Crops—contd.

mulæ supplied to them. An appropriate formula for each crop will be prepared for every district or homogeneous portion of a district by the Director of the Agricultural Department in consultation with the District Officers.

"Unimportant mixtures, such as 'peas and pulse,' or mixtures for which no formula is likely to be appropriate on account of the absence of uniformity in the proportion of the component crops or for any other reason, will not be recorded in the village registers as 'mixtures,' but as single crops, the village officer deciding the proportionate areas in each case as best he can on his own estimates.

"For example, if a formula has been prepared showing the proportion of area which wheat and barley may be assumed respectively to cover when grown together, the heading 'Wheat and barley' would be one of the headings prescribed for the village returns, and all fields containing both crops would be shown under that heading. If in the case of peas and pulse no such formula has been prepared, there would be no heading for 'peas and pulse,' and the village officer would, on inspection of the fields, enter separately the portions of the areas under the mixed crop which he might estimate to be under 'peas' and 'pulse' respectively.

"The formulæ suggested above will have to be based upon rough and general data. In tracts in which it is the custom to grow the component crops in distinct rows at normal distances, the determination of the formula will be easy. In other cases it will probably be based on information obtained by enquiry as to the usual proportion of seed sown and by enquiry or experiment as to the usual proportion of produce obtained."

Messrs. Ozanne and Francis pointed out the great difficulty of getting correct formulæ for the division of mixed crops for areas so large as districts; the former urging that the attempt to improve crop statistics by general formulæ would not give such good results as the present system of leaving the estimation to the patwaris.

36. Resolved:

That the system proposed in the Government of India Circular Nos. 50—80, dated 16th August 1893, should be recommended; that no mixtures should be shown as such in the return sent to the Central Provincial office; that in district returns they should be divided into their constituent parts either initially by the village officers or subsequently by the district staff in such methods as may be arranged on the advice of the Director of Agriculture.

(x) Agricultural Department Reports.

Agricultural Department Reports.

37. The next question brought forward was the form in which the reports of the Departments of Land Records and Agriculture should be prepared. Circulars of the Government of India, No. 54 A., dated 28th April 1884, and No. 52 G. of 14th September 1887 were read.

The President stated that the principle laid down in the latter of the Circulars was the following:—

"The report consists of two main divisions—Land Records and Agriculture—and is designed to show the executive work of the Department, not to comprise discussions on administrative measures, or to contain any description or summary of the economic or agricultural circumstances of the season. The Local Government may, however, require information of this kind to be submitted by the Department to the chief revenue authorities of the Province for utilization in preparing the Land Revenue Administration Report, and may prefer that for that purpose it should be included in the Land Record Section of the Departmental Report, rather than be submitted by independent communication. There will be no objection to this course. But there seems to be no reason why statistical statements concerning crops, irrigation, tenures, etc., should find a place in the report of the Department as well as in the Annual Land Revenue Administration Report, to which latter they should, in the opinion of His Excellency in Council, be confined. The Agricultural Section of the Departmental Report should be restricted to an account of the executive operations of the Departmental officers, and to a brief description of, or reference to, any results of special interest which may have been obtained during the preceding 12 months, whether in farms, gardens, Government estates or otherwise, but should avoid lengthy discussions on agricultural subjects and need not contain any detailed examination of the working of gardens, farms, or other agricultural institutions, which should be dealt with in the departments by orders on the Annual Reports."

The object of the above orders was to ensure that the Director should in each Province write (1) a part of, or an appendix to, the Provincial Revenue Report, and (2) a separate report on his own Department, which should be confined to an account of the work done by the Department during the year.

It was ascertained that this was the procedure followed in the Central Provinces, North-West Provinces and Punjab: in Bengal the Director only wrote his own departmental report, and did not contribute to the Revenue re-

port: in Assam the Director wrote the whole Revenue Report: in Madras the Director, being on the Board, did not write a separate report: in Bombay the procedure was at present under discussion. *Mr. Macpherson* was anxious that the Director in Bengal should be allowed to prepare a separate report, which should include not only his own departmental history, but also a review of the agricultural statistics of the year. The Conference considered that the matter was one which should be dealt with independently of their proceedings. *Agricultural Department Reports*—contd.

38. Resolved:

That the Conference approve generally of the principles laid down in the Government of India Circulars Nos. 54A., dated 28th April 1884, and 52G., 14th September 1887.

39. The question was then discussed whether the headings of the reports should not be altered so as to conform generally with those of Dr. Voelcker's report.

Resolved:

That the Government of India be invited to make suggestions on this subject, and that at any future Conference at which Dr. Voelcker's recommendations might be gone into in greater detail, the headings of the reports should be definitely revised.

(xi) Price Statements.

40. The next matter discussed was the system recently introduced in Bombay for the inspection and improvement of the Price Statements required by the Military Department for Commissariat purposes or as the basis for compensation for Native Troops for dearness of provisions and fodder. *Price Statements.*

41. After the members of the Conference had described the system in force in each Province of ascertaining and publishing prices, it was resolved:—

(1) That so far as Military requirements were concerned, it seemed desirable that the Military Department should itself take steps by Committees or otherwise, to ascertain correct prices of articles in the price of which they are interested.

(2) That the system under which certificates of prices are furnished by the District Officers to the Military authorities for other purposes than determining compensation for dearness of provisions and fodder should be abolished.

(3) That the fortnightly price returns are required by District officers mainly for assessment purposes; that for these purposes they are sufficiently accurate; that the appointment of inspectors even at the cost of the Military Department to see after the correctness of some or all of these returns is unnecessary, and that the existing agency for the preparation and inspection of these returns is sufficient, if properly worked.

42. *Mr. Macpherson and Mr. Ozanne* dissented, being of opinion that inspection by special officers would be useful for purposes of general administration. The latter was further of opinion that, inasmuch as the Military Department is bound by the Regulations to accept the prices current reported by the Civil Departments, it is the duty of the Civil Departments to take measures to secure their correctness, and that the measures taken in Bombay have not only succeeded in fulfilling that duty with great advantage to Government, but at the same time have secured a marked improvement in the accuracy of the Imperial Fortnightly Prices-current with which the Administration is closely concerned. In Bombay prices for the purposes of settlement are provided for by the taluka price registers, but the check exercised by the Price Inspectors indirectly operates as a check on the taluka price returns. Therefore the system under discussion not only meets the wants of the Military Department, but materially improves the standard of correctness in prices collected for administrative and settlement purposes.

43. Memorials from certain associations in the Central Provinces regarding the insufficiency of cattle in India were laid before the Conference, but no resolution was passed on the subject. Suggestions were also offered by *Captain Chapman* on the same subject the following day. It was considered sufficient for the present that a Veterinary department had recently been established which would in due course deal with this subject. *Insufficiency of cattle in India.*

Fifth Meeting, Friday, the 6th October 1893.

(xii) EDUCATION IN CONNECTION WITH AGRICULTURE.

Education in connection with Agriculture.

44. The following papers on this subject were read:—

(1) the conclusions and recommendations made by Dr. Voelcker in paragraphs 527 and 528 of his report, *viz.*:—

Conclusions.

"527. The spread of education will be an important element in the improvement of agriculture. It will do much to remove the prejudices attaching to 'caste' and custom, which prevent progress in agricultural methods, and it will give rise to a more intelligent farming class.

"In a country where, as in India, agriculture is the chief employment, agricultural education especially should be encouraged. Until lately the tendency of education has been in a purely literary direction, and has turned attention away from the land rather than towards it; the fault can now be best remedied by substituting agricultural education for a part of the present educational programme. The work must proceed simultaneously from above downwards, and from below upwards. Elementary instruction should be given in primary schools by means of 'Readers' and 'Object Lessons' which introduce familiar agricultural subjects. In middle schools the elements of physical science, the use of agricultural primers, accompanied by *Illustration Plots* on which the ordinary farm crops are grown, should form part of the instruction. In high schools more attention should be given to physical science and to agriculture, and *Illustration Farms* or fields should be attached to the schools. Agricultural classes should be established where colleges or institutions that especially teach agriculture do not exist, and these should have *Demonstration Farms* attached, and land on which the pupils can themselves work.

"Special attention should be directed to the Agricultural education given in colleges, in order that the teachers supplied to high schools and to agricultural classes may be well-trained men, and that the Land Revenue, Agricultural, and cognate departments may be supplied with subordinate officials who have studied agriculture, both theoretically and practically.

"I do not consider it advisable to establish special agricultural colleges, but I think that it would be better to utilise existing colleges of science and to form agricultural branches at them. Universities should encourage the study of agriculture by making agriculture an optional subject in the course for a degree, and the claims of men who have passed in agriculture should be fully recognised for appointments in the Revenue and cognate departments.

There is great need of agricultural text-books suited to the circumstances of the different parts of India, and these should be in the vernacular, as well as as in English.

Recommendations.

"528. That general education be extended among the agricultural classes.

"That agricultural education form a part of the general educational system, and be introduced as a prominent subject in the schools of the country.

"That text-books on agriculture, adapted to the different parts of the country, be prepared as early as possible.

"That encouragement be given to the higher study of agriculture by recognising more fully the claims of men who have passed in scientific agriculture for appointments in the Land Revenue and cognate departments."

(2) the Resolutions passed at the Fifth Meeting of the Agricultural Conference of 1890, *viz.*:—

Resolution I.—That in considering the question of agricultural education and progress, the Conference desire to express the opinion that it is most desirable to extend primary education among the agricultural classes.

Resolution II.—That, as a general rule, instruction in agriculture should be combined with the existing course of education, and not depend *exclusively* on separate special institutions.

Resolution III.—That it is most desirable that the Universities should recognize the Science of Agriculture as an optional subject in the course for a degree.

Resolution IV.—That it is very desirable that the elementary principles of agriculture should form a prominent subject in the education which is given in village schools with the view of creating more interest in agricultural improvement amongst the cultivating classes.

Resolution V.—That, in order to secure the object of the last resolution, it is desirable to take early steps to provide suitable teaching, the best books and "Readers."

Resolution VI.—That it is highly desirable that the claims of men trained in scientific agriculture to appointments in the Revenue and cognate departments should be as freely recognized as those of men trained in Law, Arts, and Engineering.

Resolution VII.—That where appointments in the Revenue or cognate departments are made on the result of competitive examinations, Scientific Agriculture should be included as an optional or necessary subject in the examination course. *Education in connection with Agriculture*—contd.

Resolution VIII.—That in any province in which it may be determined to introduce a scheme for higher agricultural education, no arrangements will be satisfactory which do not provide (1) for a thoroughly practical training of the students in the field and laboratory as distinct from theory or practice as taught in the lecture-room, and (2) for examination tests of a special and searching character in the above branches of work.

(3) a note by the President on Agricultural education (see Appendix III, page 46)—

It was explained that this note was prepared in order to place before the Home Department of the Government of India the general views of the Revenue and Agricultural Department on the subject for such use as the Home Department might be able to make of it in the quinquennial review of education to be shortly published: and the Conference was asked to formulate suggestions which might be communicated with a similar object. The note advocated a system of early training which should neither be purely literary nor purely technical, but should teach from surrounding objects and by means of maps, books, etc., which treat of surrounding objects. It pointed out, moreover, the benefit to agriculturists and others of an acquaintance with land-records and land-maps: remarked on proper training of teachers: and suggested the deferment of ambitious schemes of higher education until the agricultural classes were better able to adopt the discoveries of a high class of science. The note at the same time recommended the appointment in each province of a Committee (with which the Agricultural Department should be associated) to consider the reforms which should be effected in the system of rural education.

45. By way of supplement to the above-mentioned note, the *President* brought forward the necessity for the encouragement by the Universities of education useful to agricultural interests, and *Mr. Nicholson* drew attention to the proposal recently made by Mr. Grigg, Director of Public Instruction, Madras, that degrees in science and in agriculture should be established and should be opened to students who have passed the F.A. Examination. An account was given of the technical examinations in force in Madras, which was followed by a discussion regarding the necessity for holding out to successful graduates an opportunity of obtaining employment under Government.

46. *Mr. Macpherson* then drew attention to the unnecessarily difficult language of agricultural primers: and *Mr. Fuller* to the same defect in Indian Readers generally.* *Mr. Wilson* pointed out that in the Punjab the strangeness of the language was aggravated by the strangeness of the character in which it was written.

47. *Mr. Francis* emphasized the necessity for a high-class education in order to provide teachers, and the President explained that such education was not inconsistent with his note above-mentioned. The question whether teachers would be able to teach from gardens was then raised by *Mr. Middleton*, who also discussed the question of agricultural education generally, and read a paper on the subject (see Appendix III, page 48).

48. A copy of an address made by Mr. G. V. Joshi on agricultural education before the Poona Industrial Conference of 1893 was put in by Mr. Ozanne, without expression of his concurrence, and a copy of a note on the same subject by Mr. Tute, Collector of Dinajpur, Bengal, was put in by Mr. Macpherson. These are reproduced in Appendix III, pages 50 to 61.

49. It was not considered necessary that Dr. Voelcker's "Conclusions" should be adopted finally by the Conference, in view of the circumstance that they would be discussed by the Provincial Committees suggested in the President's note and in the Resolution No. 12 quoted below. Dr. Voelcker's "Recommendations" were held to be included in the resolutions passed at the fifth meeting of the Conference of 1890. These resolutions were, after some discussion, accepted as they stood, and four additional resolutions passed. The resolutions of the Conference were therefore:—

(1) *That in considering the question of agricultural education and progress, the Conference desire to express the opinion that it is most desirable to extend primary education among the agricultural classes.*

(2) *That, as a general rule, instruction in agriculture should be combined with the existing course of education, and not depend exclusively on separate special institutions.*

* See his note at page 61 in Appendix III.

Education in connection with Agriculture—contd.

(3) *That it is most desirable that the Universities should recognise the Science of Agriculture as an optional subject in the course for a degree.*

(4) *That it is very desirable that the elementary principles of agriculture should form a prominent subject in the education which is given in village schools with the view of creating more interest in agricultural improvement amongst the cultivating classes.*

(5) *That in order to secure the object of the last resolution, it is desirable to take early steps to provide suitable teaching, the best books and "Readers."*

(6) *That it is highly desirable that the claims of men trained in scientific agriculture to appointments in the Revenue and cognate departments should be as freely recognized as those of men trained in Law, Arts, and Engineering.*

(7) *That where appointments in the Revenue or cognate departments are made on the result of the competitive examinations, Scientific Agriculture should be included as an optional or necessary subject in the examination course.*

(8) *That in any province in which it may be determined to introduce a scheme for higher agricultural education, no arrangements will be satisfactory which do not provide (1) for a thoroughly practical training of the students in the field and laboratory as distinct from theory or practice as taught in the lecture-room, and (2) for examination tests of a special and searching character in the above branches of work.*

(9) *That, in the opinion of the Conference, education in the lower schools should be of such a practical character as to fit the pupils for technical pursuits, including agriculture, as well as for literary and commercial pursuits.*

(10) *That the text-books used in schools should be written in the simplest language ordinarily understood by the people, and should be descriptive of subjects with which they are familiar; also, that the use of pictorial lesson charts, illustrating familiar objects, should be encouraged.*

(11) *That the system of training in normal schools should be adapted to qualify school teachers to give instruction of the character indicated in Resolution 8.*

(12) *That in each province a Committee, in which agricultural officers should be included, should be convened at an early date for the consideration of the questions raised in the preceding resolutions.*

(xiii) Rules for the Organization of the Subordinate Civil Veterinary Establishments.

Subordinate Civil Veterinary Establishments.

50. The rules proposed by a Conference of Veterinary Officers were read, and the Conference agreed that the rules might be submitted in their present form before the Local Governments for consideration. It was agreed that the first class Diploma should not be given unless the curriculum is extended to cover a 4-year course, that in rule 7 the words 'Veterinary graduate' be changed to 'Senior Veterinary Assistant:' and that the rules of pay proposed should be allowed to stand over for consideration by Local Governments, with the addition of a proviso to paragraph 7 as follows:—"Provided that nothing shall prevent a Senior Veterinary Assistant from being appointed to the post of Veterinary Assistant."

(xiv) Suggestion to tax uncastrated horses.

Taxing uncastrated horses.

51. This was a suggestion made by the Inspector General, Civil Veterinary Department, in his letter No. 241, dated 24th July 1893, to the Government of India. The Conference were of opinion that the proposal had better not be put forward at present. The castration of horses and ponies was a measure not unlikely to give rise to difficulties and discontent, and to the danger of unduly diminishing the number of animals in the country. It would be advisable in the first instance to extend considerably the number of good stallions before taking up the question of reducing the number of inferior stallions. It would therefore be desirable to postpone the question until Veterinary Departments had settled down to their work and had done a good deal more in the direction of providing a better class of sires.

Sixth Meeting, Saturday, 7th October 1893.

(xv) Dr. Voelcker's Recommendations.

Dr. Voelcker's Recommendations.

52. The recommendations of Dr. Voelcker recorded at the end of each chapter of his report were read and discussed *seriatim*.

53. The opinion of the Conference as to the action which should be taken in respect to each recommendation is briefly noted below. *Dr. Voelcker's Recommendations*—contd.

The recommendations were divided into five classes:—

I.—Those which have been or are being taken up independently of the proceedings of this Conference.

II.—Those which are taken up in the proceedings of the Conference.

III.—Those which are already taken up by the Conference, but require special attention to be paid to them.

IV.—Matters not taken up but requiring attention.

V.—Matters on which future action may be postponed.

54. The opinion of the Conference is in many cases sufficiently indicated by the class in which the recommendation is placed.

1. *The spread of general and agricultural education.*—Class II. Chapter II, para. 22.

2. *The establishment of an organised system of Agricultural Enquiry.*—Class II. "

3. *The active prosecution of positive measures already ascertained to be beneficial, and their further encouragement by the State.*—Class II. "

4. *The desirability of extending General and Agricultural Education.*—Class II. Chapter III, para. 31.

These, *i.e.*, recommendations 1 to 4, are sufficiently dealt with in the proceedings of the Conference.

5. *The extension of canals and other means of irrigation to the drier tracts.*—Sufficiently dealt with by the Public Works Department.—Class I. Chapter IV, para. 43.

6. *The establishment, wherever possible, of "Fuel and Fodder Reserves."*—Class I.—Sufficiently dealt with by Government of India Resolution No. 16A., dated 1st March 1883. "

7. *The increase of plantations along canal banks and railway lines.*—Class V.—May be postponed. "

8. *The spread of arboriculture.*—It was considered that, although roadside arboriculture was sufficiently attended to, more attention should be given to village arboriculture,—*e.g.*, the extension of tree-planting in fields and available plots of land through the agency of landowners and ryots. This was considered important by nearly every member of the Conference. It was suggested that the Irrigation Department should facilitate tree-planting of this kind by allowing lower rates.—Class III. "

9. *The instituting of enquiry by Agricultural Departments as to where the above measures are needed, and how they may best be carried out.*—This comes under the head of District Analysis, but needs early attention and investigation.—Class III. "

10. *The increase, by means of irrigation, of the water-supply to dry tracts.*—Class I. Chapter V, para. 80.

11. *The increase of the manure-supply to the soil.*—Class II.—This must await the investigations of the Agricultural Chemist. "

12. *The instituting of enquiry to ascertain where such measures are needed and can be carried out.*—Class III. "

13. *The continuation of experimental research aided by Chemical Science.*—Class II. "

14. *The extension of canals and other means of irrigation to districts which are in need of them.*—Class I. Chapter VI, para. 115.

15. *The encouragement of minor works of irrigation by rendering the system of taccavi advances more popular.*—Class IV. "

16. *The giving to Agricultural Departments of a share in the administration of taccavi advances.*—Class IV. "

The encouragement of minor irrigation works by making advances more popular was considered most desirable. It was represented that a stronger guarantee was required that the money required for advances would be forthcoming when necessary, and it was also suggested that private money would be

Dr Voelcker's Recommendations —contd.

forthcoming if a guarantee of security could be obtained. *Mr. Nicholson* advocated the loan of funds for distribution to local credit associations—of which there were already 135 in the Madras Presidency—on the condition that the loans should be supplemented by, say, 50 per cent. contributed by the associations.

On the second question *Mr. Ozanne* drew special attention to the following extract from paragraph 113 of Dr. Voelcker's report :—

"In the last place, I am strongly of opinion that some share in the administration of *taccari* advances should be put in the hands of the Provincial Agricultural Departments. It would clearly be unwise to make any step which would bring about collision between the existing Revenue Authorities and the Agricultural Departments, and, therefore, the control and disbursement of *taccavi* advances could hardly be entrusted to the Provincial Directors of Agriculture. But at the same time the Director of Agriculture is the person who should best know the agricultural needs of his province, and he should be enjoined to give his special attention to the extended working of the *taccavi* system. Further, he should be empowered to advise the Revenue Authorities generally, and to report on specific cases, either of special need or of non-observance, in the application of the funds which have been granted."

Mr. Fuller recommended that a special staff should be employed and paid from the Taccavi fund to keep the accounts and so do away with the main obstacle now in the way of free grants of loans. *Mr. Ozanne* stated that the system was already pursued in some districts of Bombay. *Mr. Nicholson* understood that this subject had been taken up by the Madras Government, and other members of the Conference considered that it should be pressed. A suggestion by the *Assam* and *Central Provinces delegates* that a commission should be given to native officials distributing advances did not commend itself to other members.

Mr. Fuller strongly advocated the closer connection of the Agricultural Department with the system of advances, and recommended that the subject should find a special place in the annual report of the Department. The Conference agreed with this view on the understanding that the distribution of advances by district officers was not interfered with, and considered that the responsibility should be placed on the Director of bringing to the notice of Commissioners and District Officers, under such rules as the Local Governments might issue, the tracts in which agricultural advances might be usefully distributed, and the objects for which they were required.

Chapter VI, para. 115.

17. *The prosecution of agricultural enquiry in order to ascertain the requirements of each district in respect of irrigation.*—Class IV.

Chapter VII, para. 155.

18. *The establishment of "fuel and fodder reserves" for the primary purpose of supplying wood to take the place of cow-dung as fuel.*—Class IV.

19. *The inauguration of a system of agricultural enquiry, to ascertain the manurial facilities and requirements of each part of the country.*—Class III.—This is covered by the scheme of district analysis, but requires the special attention of Agricultural Departments in consultation with the Agricultural Chemist.

20. *The spread of agricultural education, to assist in teaching the value of better practices, and to break down prejudices.*—Class II.

21. *The employment of experimental farms, for the purpose of showing how manurial resources can be best used and conserved, and for demonstrating the value of, and extending, the better practices of other parts.*—Class II.

22. *The employment of an Agricultural Chemist to assist in utilizing existing manurial resources to best purpose, in discovering fresh ones, and in the solution of agricultural problems.*—Class II.

Chapter VIII, para. 198.

23. *The creation of fresh "Reserves" of wood, fuel, etc. ("Fuel and Fodder reserves") primarily for agricultural purposes.*—Class I.—This comes under Class I and is partly dealt with in recommendation No. 6, but the Conference considered that more attention should be paid to the utilization of forests for agricultural purposes.

24. *The increase of plantations along canal banks, railway lines, etc.*—Class V.—This has been dealt with under recommendation No. 7 and may be postponed.

25. *The further encouragement of Arboriculture.*—Class III. *Dr. Voelcker's Recommendations* —contd.

This has been dealt with in recommendation No. 8. It comes under the head of District Analysis. The Conference considered that the Directors should be made specially responsible for carrying out the enquiry recommended by Dr. Voelcker. Chap. VIII, para. 198.

26. *The establishment of agricultural enquiry to ascertain the requirements of each cultivating district in the matter of wood-supply.*—Class III. "

27. *The setting aside yearly of a portion of the Forest Revenue, to be applied to the extension of "fuel and fodder reserves" to meet agricultural needs.*—Class V. "

28. *The creation of more "fuel and fodder reserves" in order to supply grass for agricultural purposes, and also grazing where it can be permitted under proper restrictions.*—Class I.— *Mr. Wilson* suggested that more might be done in the direction of establishing close seasons for grazing. *Mr. Fuller* noticed that the limitation of the number of cattle having access to grazing areas was important. Chapter IX, para. 233.

29. *The extension of grass farms, and their management by a special Forage Branch of the Commissariat.*—Class I. "

30. *The carrying out of investigations at Government Experimental Farms on the best methods of making silage.*—Class V. "

31. *The extension, wherever practicable, of the systems of growing fodder-crops, and of hedging or otherwise enclosing fields, more specially in parts where no pasturage exists or where it is very scarce.*—Class V. Chapter X, para. 244.

32. *The employment of an Agricultural Chemist for India to investigate, among other matters, the comparative values of different Indian Fodders* — Class III. The subject was one to which the attention of the Agricultural Chemist should be brought. "

33. *The continuance and extension of cattle-breeding farms and the distribution from them to villages, through Government agency, of stud bulls suitable for improving the agricultural cattle of the country.*—Class V. Chapter XI, para. 275.

34. *The making Experimental Farms and Court of Wards' Estates centres for the location of stud bulls.*—Class V. "

35. *The establishment of Dairy Farms for the supply of Milk to Troops and Government Institutions.*—Class I.—It was understood that the Military Department had taken sufficient action in connection with promotion of dairies for the supply of milk to troops, but the Conference considered that it would be very desirable that an expert should be continued to be employed under Agricultural Departments for the promotion of Dairy Farms, and suggested that Local Governments should be invited to share in the expenditure and to co-operate in utilizing the services of an expert for purposes of inspection and instruction. "

Mr. Ozanne, quoting from Mr. Mollison, did not agree with Dr. Voelcker's remark that there is a limited space for improvement in dairies, and promised to write further on this subject when the papers were circulated. His note will be found in Appendix III, page 62.

36. *The appointment of an Agricultural Chemist to investigate matters connected with Dairy Farming.*—Class III. "

37. *The prosecution of enquiry into cattle diseases and into the means of preventing cattle epidemics.*—Class I. "

38. *The exhaustive trial of new implements at Government Experimental Farms.*—Class I. Chapter XII, para. 298.

39. *The association in trials of implements of men specially skilled in the respective sciences concerned in the enquiry.*—Class V. "

40. *The distribution of approved implements from Government Farms and the utilization of Agricultural Shows for demonstrating the working of such implements.*—Class V. "

41. *The continuation of experimental enquiry at Government Farms in regard to selection and change of seed, growth of new varieties of crops and of* Chapter XIII, para. 322

Dr. Voelcker's Recommendations —contd.

crops altogether new, methods of cultivation, etc.—Class II.—*Mr. Francis* urged that the enquiries referred to should not be confined to Government Farms, but be worked out also on cultivators' fields and private lands. The Conference agreed.

Chapter XIII, para. 322.

42. *The establishment of seed farms under Provincial Agricultural Departments for providing good seed for the various districts; and the giving of facilities and encouragement for the purchase of seed from these farms by the cultivators.*—Class IV.—The Conference considered that very careful experiment was needed in order to prove what is really good seed for each locality; the subject was one in which early and careful enquiry was required. No attempt is usually made by cultivators to retain good seed. *Mr. Nicholson* stated that experience in Madras indicated a difficulty, *viz.*, that good seed deteriorated very rapidly on account of defective agricultural practice. *Mr. Francis* suggested that the system proposed by Dr. Voelcker should be expanded, and that good seed should be obtained by purchase from other parts of the country, and that large landowners should be induced to make experiments for the purpose for determining what was the best seed for the locality.

43. *The pursuit of the study of diseases and injuries of crops.*—Classes I and V.—The investigation of insect pests is being carried on under the direction of Mr. Cotes of the Indian Museum. The Conference agreed that it would be very desirable that Mr. Cotes should be placed in personal communication with Directors and inspect the crops injured by insect pests on the ground. The investigation of other diseases of crops must await further opportunities.

44. *The organization of a system of agricultural enquiry for the purpose of obtaining a thorough knowledge of present agricultural methods and for the transference of better methods to districts where inferior ones prevail,*—Class II.—*Mr. Wilson* strongly recommended the Court of Wards' Estates for the purpose of Agricultural Enquiry as they now are. He did not refer to trying experiments at the expense of Courts of Wards, but only to the conduct of enquiries on the Estates in view of the fact that statistical results can be obtained on them of a more satisfactory character than on other lands. He had already utilized a Court of Wards' Estate for this purpose with, he believed, success, and promised a note on the subject which will be found in Appendix III, pages 63-64. *Mr. Francis* said that we should have to wait for our Agricultural experts as investigating agents before we could expect to carry out this plan systematically. Otherwise the Conference agreed.

Chapter XIV, para. 391.

45. (*a*) *The setting on foot of enquiry by Agricultural Departments in order to ascertain the best methods of cultivation and manufacture of crops, such as sugarcane, indigo, tea, coffee, tobacco, etc., and* (*b*) *the endeavour by demonstrating these methods to extend the cultivation and increase the outturn*—(*a*) Class II and (*b*) Class V.

46. *The employment of Chemical Science in the investigation of problems affecting these industries, and more particularly that of an Agricultural Chemist in connection with the sugar industry.*—Class V.

47. *The making it a penal offence to adulterate wheat, or to export or trade in adulterated wheat.*—Class V.

Chapter XVI, para. 413.

48. *That a definite system of organized enquiry into agricultural conditions and practices be instituted forthwith.*—Class II.

49. *That a Permanent Agency be established for this purpose, and consist of the association with the Director of the Department of Land Records and Agriculture of an Assistant or Assistants who are trained experts in Agriculture.*—Class II.

50. *That such experts be, by preference, Natives of India, and be trained in the country itself.*—Class II.

51. *That high-class Agricultural Education be provided in India so as to train the men who are to become Agricultural experts.*—Class II.

Chapter XVII, para. 438.

52. *That an Agricultural Chemist be appointed for India, to act as adviser to Government in chemico-agricultural matters, to carry out investigation and to direct Experimental Enquiry.*—Class I.

53. *That an Assistant Chemist be appointed to act under the above officer and to teach Agricultural Chemistry.*—Class I. Dr. Voelcker's Recommendations —contd.

54. *That to the Agricultural Department should be attached other scientific officers, such as a Botanist, an Entomologist, and an Agricultural Engineer for the purposes of Agricultural Enquiry.*—Class III. Chapter XVII, para. 438.

55. *That agricultural enquiry be continued by means of Experimental Farms.*—Class II. Chapter XVIII, para. 497.

56. *That distribution of selected seed and location of stud bulls be undertaken by Experimental Farms, as also the breeding of farm stock, where circumstances are favourable.*—Class II. "

57. *That Demonstration Farms be instituted in connection with Experimental Farms in order to set out the results of successful enquiry.*—Class V. "

58. *That General Education be extended among the Agricultural classes.*—Class II. Chapter XIX, para. 528.

59. *That Agricultural Education form a part of the general educational system, and be introduced as a prominent subject in the schools of the country.*—Class II. "

60. *That text-books on Agriculture, adapted to the different parts of the country, be prepared as early as possible.*—Class II. "

61. *That encouragement be given to the higher study of Agriculture by recognising more fully the claims of men who have passed in scientific agriculture, for appointments in the Land Revenue and cognate Departments.*—Class II. "

Mr. Wilson promised a note (*vide* Appendix III, page 64) on the desirability of prescribing Agriculture as a subject in patwaris' examinations.

62. *That more weight be given to Natural Science in the open competitions for the Civil Service, and at the final examination of probationers.*—Class I.—The Conference considered that it would be unadvisable to make any suggestions in support of this recommendation. They were not sure that the subject had not been sufficiently considered by the Civil Service Commissioners. Chapter XX, para. 546.

63. *That a certain proportion of junior Civilians, on arrival in India, be drafted into Departments of Land Records and Agriculture.*—Class IV.—This proposal had been to some extent met by the action taken in various Provinces, but required in the opinion of the Conference to be more definitely taken up. *Mr. Fuller* advised that every junior Civilian should be required to go through a course of instruction either under a Settlement officer or under the Director of Land Records. The Conference were of opinion that the question should be brought to the notice of Local Governments and Administrations; and the members promised to submit notes on the existing practice in their respective Provinces with recommendations for the future. Their notes will be found in Appendix III, pages 65 to 69. "

64. *That Agricultural Directors be chosen from those men who have distinguished themselves in Natural Science, and subsequently by their interest in Agriculture.*—Class IV.—It was the opinion of the Conference that, in selecting a Director of the Department, consideration was generally given to the qualifications suggested by Dr. Voelcker. They considered, however, that the recommendation made by Dr. Voelcker might be usefully brought to the notice of Local Governments. "

65. *That Agricultural Directors be given some administrative powers, and that a share in the management of Loans for Agricultural Improvement be entrusted to Agricultural Departments.*—Class II.—Dealt with under recommendation 16. "

66. *That a considerably increased amount of money be placed at the disposal of Agricultural Departments for expenditure upon Agricultural Improvement.*—The Conference were not prepared to make any definite suggestion under this recommendation in view of the present financial difficulties. They were, however, of opinion that the importance to the public exchequer of promoting agricultural improvement was too little regarded by our administrations. The revenues of the empire must in the future, even more than in the past, depend upon the land-revenue, which in its turn depended greatly upon the "efficiency "

Dr. Voelcker's Recommendations —contd.

of agricultural operations." This view was strongly urged when the Departments of Agriculture were created, in the Imperial Resolution of December 1881, and they considered that it should again be impressed upon Local Governments and Administrations, who should be advised, they thought, to bear it in mind when dealing with those recommendations of Dr. Voelcker which were supported by the Conference. In most cases it was not necessary, for the purposes suggested, to place money in the hands of the Agricultural Directors. It would be sufficient that the advice of the Directors, should receive careful and attentive consideration. Under the policy recommended at the present Conference, money would be chiefly required for purposes of Education, and for the conduct of agricultural enquiry and experiment; and much could be done in these directions without any excessive demands upon the budget. In connection with Education especially, expenditure would be reduced to a minimum if the policy be carried out of admitting more freely to official appointments, students who had successfully passed an academical course in physical sciences and agriculture.

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APPENDIX I.

Resolution No. $\frac{3}{11}$, dated 22nd June 1893, convening the Conference.

The Government of India have now received copies of the report prepared by Dr. Voelcker, who was deputed in 1889-90 to investigate the conditions of agriculture in India: and the opportunity is taken in circulating them to Local Governments and Administrations to explain the position which the report occupies in the development of the scheme undertaken in 1880-81 for agricultural enquiry and improvement. *Resolution convening the Conference.*

2. One of the chief recommendations made in the report of the Famine Commission in 1880 was the formation of Agricultural Departments, of which the ultimate aim was to be the improvement of Indian agriculture. In 1881, the Imperial Department of Revenue and Agriculture was created for the purpose of directing the policy to be followed in carrying out the Famine Commission's recommendations; and in December of that year a Resolution was issued in which a comprehensive scheme, based on the suggestions of the Famine Commission, was drawn up. The Resolution commenced by explaining that before any attempt could be made to improve the agriculture of the country, it was necessary to enquire into, and collect information regarding, the agricultural conditions in each province.

No. 6-340-350-G., dated the 8th December 1881.

3. The first step to be taken in this direction was to organize the land-record establishments, and during the twelve years which have since elapsed, these establishments have in most provinces been brought into fair working order, so that they can now be utilized for the collection of facts and statistics.

4. Another measure was to constitute a system of scientific enquiry by means of experts in those branches of investigation which were beyond the scope of the ordinary establishments. With this object there have been successively established the office of Reporter on Economic Products and the Civil Veterinary and Bacteriological Departments. The Departments of Meteorology and Geology already existed, but the attention of both has been called more distinctly than before to the work of practical investigation. At the same time the Trustees of the Indian Museum have consented to carry out through their staff enquiries connected with Economic Entomology and Zoology; while the Botanical Survey, previously restricted to three Provinces, has been extended over the whole of India.

5. None of these departments or institutions, however, were connected with agriculture proper, and from 1882 to 1888 representations were made to the Secretary of State that the scheme of enquiry could not be completed without an agricultural expert, who should organize and develop a system of agricultual investigation in those directions in which scientific control was wanted. In 1889 Dr. Voelcker was sent out to India by the Secretary of State—"to advise on the best course to be adopted in order to apply the teachings of Agricultural Chemistry and in order to effect improvements in Indian agriculture." Dr. Voelcker's preliminary recommendations led to the appointment, in October last, of an Agricultural Chemist, who, with the aid of a laboratory Assistant, appointed at the same time to teach in the Forest School at Dehra, will take the position of the expert asked for by the Government of India.

His duties will be necessarily concerned with a larger field than that implied by the term "Agricultural Chemistry," and it is one of the objects of the present Resolution to indicate to some extent what the duties and functions of the Agricultural Chemist will be.

6. In the detailed report now submitted Dr. Voelcker makes numerous recommendations in the direction of agricultural improvement and reform, many of which cover the same ground as those of the Famine Commission. His suggestions come indeed mainly within the scope of the programme set out in the Resolution of 1881, to the principles of which the Government of India still adhere as forming the basis of the scheme of agricultural enquiry and improvement; and, although his suggestions point, as did the Resolution of 1881, to the ultimate establishment of positive measures for improvement, they do so with the same proviso that "before any real improvements can be effected in agriculture the institution of organized enquiry into existing methods is absolutely necessary." The Government of India desire, therefore, that for the present the main duty of the Agricultural Chemist should be to take his place in the scheme of enquiry rather than to institute what may prove to be premature efforts in the direction of agricultural improvement.

7. It will in the first place be necessary for the Provincial Departments of Agriculture to carry out more effectively than has hitherto been done, the instructions for establishing the system which in the Resolution of 1881 was briefly designated as "district analysis." This subject was discussed at the Agricultural Conference held in 1890 at Simla, but has not as yet been fully understood. The object of the scheme was to define with some precision, through the aid of the statistics collected by the land-records agency, the tracts in each district which are subject to failure, or, to use the words of the Resolution, in which the "agricultural operations of the country are liable for any reason to fall below the standard of full efficiency." When some progress has been made in a careful analysis of agricultural tracts, the expert will be usefully associated with the Agricultural Departments in investigating the causes of failure

See also Circular No. 55 R. of the 8th May 1885.

Resolution concerning the Conference— contd.

and in suggesting the remedies to be applied. As soon as this stage has been reached, the greater number of those recommendations of the Famine Commission and Dr. Voelcker which deal with positive measures of remedy and improvement, will have to be taken under serious consideration : and, although it may be the case that in some directions enquiry has proceeded sufficiently far to justify immediate action, especially in tracts where agricultural depression is extreme, yet there is no doubt that in the main a considerable period must still be occupied in the preliminary work of investigation.

8. Another branch of enquiry is concerned with the existing methods and practices of agriculture throughout India. This will be entrusted primarily to the Agricultural Chemist. It will involve the collection and collation of facts and statistics contained in gazetteers, settlement reports, and other such sources of information, and will require both personal investigation in the field and continual communication with the officers of the Agricultural Departments.

9. The necessity of ascertaining by continuous and scientifically-directed trial on experimental farms what are the possibilities of improving existing methods was indicated in the Resolution of 1881, and measures have been taken in almost every province to establish farms for this purpose. The inspection of farms ; the general direction of the system on which experiments are to be conducted ; and the preservation of continuity in experiment will be further and important duties of the new officer.

10. The scheme of agricultural enquiry will also entail a systematic analysis of soils, water, manure, etc., in the laboratory, and these will be conducted by the Agricultural Chemist and the Assistant.

11. It will at the same time be essential that with the co-operation of the Educational Departments measures should be taken which will render the agricultural population capable of assimilating new ideas and of understanding any suggestions made to them, as time goes on, for the improvement of their agricultural methods ; and which will qualify them to take that active part in the scheme of agricultural reform without which no effective results can be expected. The necessity of adapting the educational system to the requirements of the agricultural population was not dealt with in the Resolution of 1881. The Government of India, however, in the 25th paragraph of the Resolution on Education, issued by the Home Department in June 1888, recommended that this subject, among others, should in each province be brought under the consideration of a Committee. The question of agricultural education was also discussed in a valuable note submitted by Mr. F. A. Nicholson to the officers who reported in May 1889 on the Agricultural Department of the Madras Presidency. In that note Mr. Nicholson urged that in developing the efficiency of an Agricultural Department it would be necessary to consider "what means will render its operations more efficient by promoting the intelligence and receptivity of the ryot, by developing the agents rather than the mere methods of production, and by provoking them to take the initiative instead of waiting for an impulse *ab extra*."

12. The Government of India, while placing their views before Local Governments and Administrations, do not desire to communicate in any more precise form their instructions regarding Dr. Voelcker's report until they have had the opportunity of referring the questions raised to an Agricultural Conference, at which Local Governments and Administrations should be fitly represented. They have accordingly determined that a Conference shall be held at Simla on the 2nd of October next, for the purpose of considering the definite measures which should be suggested for adoption and of determining the part to be taken in them by the Agricultural Chemist It is anticipated that the proceedings of the Conference will be brought to a conclusion within a week from the date on which they commence.

13. The special subjects to be brought under consideration at the Conference will be those mentioned in paragraphs 4 to 11 above, namely :—

(i) the completion of the scheme of investigation by scientific experts (paragraph 4),

(ii) the further development of "district analysis" (paragraph 7),

(iii) the compilation of a gazetteer of existing agricultural methods (paragraph 8),

(iv) the conduct of experimental farms (paragraph 9),

(v) the system to be adopted in arranging for the analysis of soils, water, manure, etc. (paragraph 10),

(vi) agricultural education (paragraph 11).

The opportunity will also be taken to consider, in consultation with the officers of the Civil Veterinary Department at head-quarters, the subjects of the prevention and cure of cattle-disease, and the further promotion of horse-breeding.

14. If any Local Government desires that other subjects dealt with in Dr. Voelcker's report should be specially discussed by the Agricultural Conference, the Government of India will be glad to make arrangements accordingly ; but they are of opinion that the particular consideration of subjects other than those mentioned in the last paragraph may, generally speaking, be usefully deferred until further advance has been made in the direction of agricultural enquiry.

These instructions are not in any way intended to preclude the consideration by Agricultural Departments of matters connected with the improvement of agriculture in cases where urgent or early measures are called for, or to deprecate any action by Local Governments and Administrations which it may be deemed by them inexpedient to postpone. As at present

advised, the Government of India are disposed to believe that in cases of this kind the recommendations included in Dr. Voelcker's report will be found to be in general accord with the approved policy of the Provincial and Imperial Governments, and may properly be quoted in support of such measures as it may be thought necessary to adopt in the interests of agriculture without further delay. But they do not propose that the Conference now summoned should itself attempt to deal with those portions of Dr. Voelcker's report which are concerned with the final rather than the initial stages of the scheme. *Resolution convening the Conference—contd.*

15. Local Governments are invited to depute to the Conference the Directors of the Agricultural Departments and any other officers whom it may be thought advisable to send, and to provide them with any instructions which it may be considered necessary to give in connection with their own views on the subjects to be discussed. In conclusion the Government of India desire that they may be provided, before the 1st of September next, with the names of the officers delegated, as well as with a statement of subjects other than those named in paragraph 13 which it may be desired to have brought under discussion.

APPENDIX II.

The President's Opening Address.

The main object with which this Conference has been summoned is to frame, for the consideration of Local Governments, a general scheme for giving effect to Dr. Voelcker's recommendations. Dr. Voelcker's report, however, must be held to be subsidiary to the report and recommendations of the Famine Commissioners, and any measures proposed in pursuance of his suggestions must be brought into accordance with the policy adopted for carrying out their views and advice. *President's Opening Address.*

2. The Famine Commission itself was constituted at the instance of Parliament by the Secretary of State, who thus stated the general object which he had in view:—"It is evident," he wrote, "that the protection of the people of India from the effects of the uncertainty of the seasons will constitute in the future no inconsiderable portion of the work of the Government. It is therefore a duty to collect with the utmost care all information which may assist future administrators in the task of limiting the range or mitigating the intensity of these calamities."

As noted in the Famine Commissioners' report, the Government of India amplified the instructions conveyed in the Secretary of State's despatch; they urged the collection of information "how far local influences, peculiarities of administration or tenure, climate, soil, water, density of population, systems of cultivation, etc., have tended to mitigate or intensify the inevitable effects of famine." They required an examination of various systems of relief; they demanded an investigation as to the future protection by irrigation and forests; they called for an enquiry as to the possible improvement of agriculture under State encouragement; as to the extension of communications; and as to the organization of agricultural statistics.

3. It would be unprofitable to attempt in these prefatory remarks to follow the Famine Commissioners in their conscientious and careful investigation of the subjects committed to them for examination. I desire only to draw prominent attention to the fact that the policy of Agricultural Departments in India must continue to be based upon the requisitions of the special Commission appointed under orders from England, and that the public both in India and England have a right to know what that policy is and how it is carried out.

Questions put from time to time in Parliament indicate that doubts on the subject still exist. In one enquiry, to which a reply has recently been formulated, information has been demanded as to the extent to which the Famine Commissioners' recommendations have been carried out: in another it has been asked how far Dr. Voelcker's recommendations are covered by those of the Famine Commissioners; other enquiries have called for investigation in fields which are already under examination by Agricultural Departments in pursuance of the Famine Commissioners' suggestions and which concern in one way or another the condition of the agricultural population in India.

4. The Famine Commissioners themselves dealt, as far as they could, with most of the matters to which their attention was called, but they were obliged to admit that their time was too short, their data too incomplete, and their information too imperfect to enable them to arrive at safe conclusions on the greater number of the issues which they formulated. They closed their report with a demand that the Imperial and Agricultural Departments, of which they recommended the formation, should prosecute the enquiries which they had begun in such a way as to enable Imperial and Local Governments to decide on the measures necessary to secure the maximum agricultural prosperity of the country.

In 1881, with the sanction of the Secretary of State, an Imperial Department was formed with express instructions to arrange with Local Governments for the formation of an Agricultural Department in each Province. The main objects which, in pursuance of the recommendations of the Famine Commissioners, the Departments were to hold in view were broadly described by the Secretary of State in the following terms:—

Firstly.—More complete, and systematic ascertaining and rendering available of the statistics of vital, agricultural, and economic facts for every part of India,

President's Opening Address—contd.

in order that Government and its officers may always be in possession of an adequate knowledge of the actual condition of the country, its population, and its resources.

Secondly.—The general improvement of Indian agriculture with the view of increasing the food supply and general resources of the people.

Thirdly.—Better and prompt organization of famine relief whenever the actual approach of famine may be indicated by the statistical information.

5. The Secretary of State's programme was accepted by the Government of India in the Resolution of 1881, in which, while the formation of Provincial Departments was directed, the objects before them were briefly summed up with reference to the Secretary of State's injunctions, as 'agricultural enquiry,' 'agricultural improvement,' and 'famine relief.' The last named of these three objects required the most urgent attention, and steps were therefore at once taken, while the Provincial Departments were being formed, to draw up codes regulating famine administration. These have been lately revised, and there is now reason to believe that the approach of scarcity is everywhere fully met by prompt measures for the protection of affected tracts, and that ample relief is ensured to all who may require it during any period of famine. The subject of famine relief need not, therefore, come under consideration at the present Conference, which will deal only with the subjects of agricultural enquiry and agricultural improvement.

6. Taking agricultural enquiry first, it may be noted that these two words cover an extensive field. They include a very large proportion of the requisitions made in their voluminous reports by the Famine Commissioners and Dr. Voelcker. The first step towards a sound scheme of agricultural enquiry was obviously to organize a machinery for collecting information. Fortunately in almost every Province this already existed in the village land-record establishments, which only needed to be properly trained and supervised in order to meet initial requirements. As urged by Sir Henry Durand in 1866, when agricultural departments were first proposed, "we are already in possession of a splendid local machinery in our local establishments closely connected with the operations of agriculture," and it was Lord Mayo himself who insisted that this should be "utilized in the collection and production of those Agricultural Statistics, and in the dissemination of knowledge, which are so essential to the development of agriculture."

7. Fortunately also the organization of the land-records establishments met an administrative need in providing a machinery which could be utilized in the assessment of land-revenue and in the maintenance of a record-of-rights, on a system which has resulted in an important saving of State expenditure, amounting to several lakhs of rupees per annum. The formation of the so-called Agricultural Departments has, therefore, resulted in a financial gain. Independently of future economies, it has been estimated that the Imperial and Provincial Departments have, by introducing an improved system of land-revenue administration, already saved something like 200 lakhs of rupees. An indirect financial advantage has also been secured both for the State and for the agricultural community by the simplification of the procedure in suits relating to land in consequence of the maintenance of a clear and fairly accurate record-of-rights. It is hoped, moreover, that the record-of-rights will as time goes on be recognized as the only record that need be maintained for registering transfers of rights and interests in land, thus enabling us to introduce into India the system of registration which Sir Henry Maine described "as the greatest legal discovery of the age," and which he contended could, if the village land-record establishments were properly organized, be adopted in India more easily than in any country in the world.

8. The land-record establishments have now been organized and trained in the majority of Indian Provinces. In Assam, Burma, the Punjab, the North-West and Central Provinces and in Madras the arrangements may be said to be fairly complete. In Bombay active measures have been taken in the same direction. In Bengal, difficulties, attributable to a long disuse of village establishments, have existed which it is hoped may be overcome, at any rate in Behar in connection with the survey. In one important Native State, Gwalior, the system has been introduced with much financial success, and there is reason to believe that the example will be followed in some other Native States.

9. I have on this occasion, as heretofore, dwelt upon the financial advantages resulting from the organization of the land-record machinery, without which no safe measures can be taken in pursuance of the Famine Commissioners' recommendations, because it is absolutely certain that the Agricultural Departments which the Famine Commissioners demanded would not have survived for a single decade if they had not been able to show that they paid their way. This danger I, for one, foresaw from the first, and it was signally proved in the requisition made by the Finance Commission appointed to reduce public expenditure that the Departments should, unless they could show that they were remunerative, be abolished. How the Famine Commissioners' scheme, as interpreted by the Secretary of State, could then have been carried out it is difficult to conjecture. The Departments, however, were in almost every case able to prove their financial value, and the Famine Commissioners' programme was thus saved. In these circumstances, no critic is justified in blaming them for the time and labour devoted to the organization and improvement of the land-record establishments, merely because the useful results due to their action are to some extent additional to those directly called for by the Famine Commissioners. The point is that the machinery utilized to

secure financial results is the very machinery wanted to provide the information and statistics demanded by the Commission.

10. No one who has not been connected with the work appreciates the time and difficulty involved in bringing the village establishments up to the requisite standard of efficiency, and those who are disposed to impute to the Agricultural Departments undue delay in giving effect to the Famine Commissioners' requisitions ought to allow themselves an opportunity of examining the subject. Suffice it for the present to say that the number of petty officials who have had to be trained and taught to maintain the map and land records is not much less than 100,000, that when the work began a large proportion of them were imperfectly educated, while many of them were too old to be instructed and had to be gradually replaced by more competent successors. Also that something like 4,000 or 5,000 supervising officials had to be selected and trained in the duties of control. Even now the task is not completed.

11. The next step was to improve the system of village records in such a manner that they might serve both for purposes of revenue administration and for those which were indicated by the Famine Commissioners. This too has been accomplished almost everywhere by the Provincial authorities with the assistance of the new Departments, and the time has now come when, as anticipated in the Resolution of 1881, the records can be satisfactorily utilized for the purpose of effecting an analysis of the rural economy and condition of every agricultural tract. The system on which the analysis should be made was a question brought under discussion at the Agricultural Conference in 1890, but requires reconsideration in connection with Dr. Voelcker's report.

12. The Resolution of 1881 is quoted in the next paragraphs. The 'analysis' or investigation of agricultural tracts was intended to secure positive facts and precise statistics where the Famine Commissioners found only uncertain evidence and conjectural figures; to provide for our administration a solid groundwork of accurate and complete information; and to do away in the course of time with the loose assumptions and haphazard guesses which have led, or misled, so many well-intentioned reformers to the proposal of impossible schemes for the benefit of the agricultural population.

"India," wrote Sir John Strachey when the first Land-Record Department was founded, "is an agricultural country composed of a multiplicity of minute holdings, and almost every subject which we take in hand in connection with the administration of the country must be referred to the units of which it is formed. A measure which makes a very slight alteration in the condition of each unit may have a very important effect on the whole country, since what may be termed the atomic changes are combined by an enormous multiplier. It may seem a little thing to ensure the correct record of facts connected with a single field, but when we consider that the country is nothing but a *congeries* of single fields, the subject assumes an importance which is apt to be lost sight of in discussing the manipulation of a village register."

13. To return now to the scheme of agricultural analysis as defined in the Resolution of 1881. The programme was put forward in the following terms:—

"The chief duty of the Agricultural Department will be to deduce from the facts and figures supplied by the village records those conclusions or suggestions which the Famine Commissioners have shown to be necessary to the administration of a Province.

"8. In considering this part of the subject, it is necessary to point out that the agricultural inquiry should not be confined to the mere collection or collation of *statistics* in the ordinary acceptation of the term. An examination of the portion of the Famine Commissioners' report which deals with agricultural enquiry will show that, in recommending with reiterated force an intelligent system of investigation, their final object is to urge through its means, and as a practical outcome of its results, the policy of *maintaining agricultural operations at the highest attainable standard of efficiency*. The Government of India fully accepts this definition of a most important aim of agricultural enquiry. The maintenance of agricultural operations implies the full sustenance of agricultural labour and the complete provision of agricultural requirements, and in India this means that cultivators, their families and cattle, must be properly fed, and their need for labour, irrigating machinery, and agricultural implements adequately met. Now, insufficiency of food, as well as the deterioration or lack of mechanical appliances, must diminish the effectiveness of labour, and thereby reduce the produce of the country. If, therefore, through rack-renting or any unsuitable system of collecting rent, if from inability to obtain capital on reasonable terms, or if from accidents of season and other causes, the amount to produce becomes less than sufficient to provide the sustenance and appliances required by labour and land, it becomes the imperative duty of Government to ascertain whether any legitimate means can be provided to check the degradation of agriculture which must otherwise ensue. On the other hand, if by any means the efficiency of agricultural operations can be increased, a larger amount of produce will be available both for the support of labour and the provision of mechanical requirements, and also for the rent found from which the land-revenue of the country is derived. Thus, apart from any consideration of the suffering due to an inadequate food-supply, a great economic error is committed if the agricultural operations of the country are allowed to fall below the standard of full efficiency. The relief or prevention of such deterioration is therefore an object which should have prominence in the work of every provincial Agricultural Department.

"9. In investigating the conditions under which the agriculture of any part of a province is exposed to deteriorating influences, it is necessary, first to localize the evil, then to discover its cause, and finally to devise such protective arrangements as may remove or alleviate its injurious action. In India no causes tend more forcibly to the inefficiency of agricultural operations than the uncertainty of produce due to variation of seasons and the incompatibility of fiscal arrangements with this condition. The numerous indications which are given of agricultural distress in various parts of the country are found, with few exceptions, to point to the existence of these factors as its prime causes. . . . . No assurance can be accepted that any province is secure

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against agricultural difficulties and distress until a detailed investigation of the condition of every part of it has been made and a system established under which a thorough knowledge of the circumstances of every village may be continuously maintained from year to year by competent officials. To this analysis of the rural economy and condition of each province the Governor General in Council attaches great importance.

"10. When such an analysis has in any province succeeded in ascertaining the cause of agricultural difficulties and distress in any locality in which they exist, the Agricultural Department should at once endeavour to strike at the root of the evil by positive treatment. It may be that the remedy will be found in the improvement of communications, the construction of canals or wells, the plantation of forests or fodder reserves, the supply of seed-grain and cattle, or the promotion of emigration. It may be that some reform in the fiscal system or in the laws relating to landlords and tenants is required in order to enable the cultivating community to protect its own agricultural interests. Careful enquiry will inevitably result in useful suggestions or in sound action."

14. The succeeding paragraphs are worth quoting in order to show that the more direct recommendations of the Famine Commissioners for positive measures of agricultural improvement were not lost sight of, but that it was *deliberately and advisedly decided to defer any general measures of attempted reform in agricultural practice until a safer foundation of facts and statistics had been secured.* Had any other course been pursued we should have had to encounter, not indeed the imputation of undue delay in giving effect to the Famine Commissioners' proposals, but the far more serious charge of wasting the public taxes in undigested schemes and extravagant action. Dr. Voelcker has laid almost equal stress on the importance of this policy in his XVIth chapter, in which he states that before any real improvement can be effected in agriculture, the institution of organized enquiry into existing facts and conditions is absolutely necessary. The Resolution of 1881 continued thus:—

"11. The Department having thus primarily directed its attention to those parts of the country in which agriculture is depressed or its result uncertain, may hereafter give consideration to the general improvement of agriculture by the introduction of new staples and implements, the trial of new industries, and the experimental adoption of new methods. In dealing with these questions, it may, as time goes on, become the duty of the Department to enquire how far the physical researches of the West may be beneficially applied to the agricultural system of this country, and to associate with itself in this investigation the assistance of qualified experts. Engineering science would be required for the construction of works of irrigation or of improved agricultural implements; the science of the veterinary surgeon will be necessary when the breeding or diseases of cattle are dealt with; the science of forestry is called for in arboriculture and reboisement, and science of divers kinds for the development of various industries. Finally, the science of agricultural chemistry will be demanded for the solution of many important agricultural problems.

"12. The Government of India desires, moreover, to express its conviction that in dealing with agricultural improvement the earliest ambition of the Agricultural Departments should be to secure the active aid of those members of the Native community who are sincerely interested in agriculture. It is after all only through and by the Native community that agricultural improvements can on any important scale be effected. Native gentlemen have experience and facilities for extending improvements which no official can hope to obtain, while in many provinces they have a large amount of capital available for investment in agricultural enterprise. They are familiar with the usages of the cultivating classes. They understand the existing system of Indian agriculture, and they are often acquainted with the local reasons which justify practices that may seem strange and illogical to an European observer. They can therefore best guide the course of agricultural improvement with the least disturbance of existing circumstances, and develop the true policy of progress in improving and adding to indigenous conditions without that subversion of ideas and methods which is likely to accompany the introduction of exotic reforms. To secure their co-operation is therefore an important object. Nor must it be forgotten that a further valuable source of information and advice exists in the European community of planters and landlords, who have already given a useful lead to Native enterprise in the adaptation of Western appliances to the agricultural system of the East.

"13. The views of the Government of India may be summed up by saying that the foundation of the work of an Indian Agricultural Department should be the accurate investigation of facts with the view of ascertaining what administrative course is necessary to preserve the stability of agricultural operations. It is desired therefore that the new departments should be so constituted as to give the fullest effect to this policy. The primary efforts of the departments should, when established, be devoted to the organization of agricultural enquiry, which has been shown to comprise the duties of gauging the stability of agricultural operations in every part of a province, of classifying the areas of the province according to the result of careful investigation, and of deciding what method of administrative treatment is suitable to each, so as to maintain agricultural operations up to the highest standard of efficiency possible under present conditions. From a system of agricultural enquiries thus conducted will follow the gradual development of agricultural improvement in its manifold variety, and the Government of India will be satisfied if, on the first constitution of an Agricultural Department, the organization of agricultural enquiry is placed in the hands of qualified officials, to whom may be committed the subsequent preparation of carefully-considered proposals for agricultural improvements."

15. It will be noted that the practical action suggested in paragraph 10 is of a more general character than are the positive measure indicated in paragraph 11. It has been possible, therefore, while the Agricultural Departments have been organizing the land-record system, to make some progress in the various directions suggested in paragraph 10. Communications have been vastly improved and extended by the Public Works Department. New canals have been opened. The construction of wells has been encouraged. Forests have been made more serviceable to the rural population. Emigration has been promoted, and more liberal laws for the supply of agricultural advances have been introduced. Finally, in almost every Province the enactments dealing with landlords and tenants have during the past decade been amended or recast. It is true that much remains to be done, but what remains depends mainly on the investigations for which the Agricultural Departments are responsible.

16. The reforms or improvements of paragraph 11, which are of a more strictly agricultural character, depend to a still greater extent upon the results of careful enquiry and upon a protracted analysis of agricultural conditions. A diagnosis of the disease to which each agricultural tract is subject must be made before a treatment can be prescribed for it. General remedies can be, and have been, adopted for the general improvement of rural circumstances,

but special cures cannot possibly be attempted without risk of discreditable failure and financial loss until the diagnosis is complete.

17. Pursuing the analogy, we may notice that while the earlier paragraphs of the Resolution deal rather with the diagnosis of symptoms, paragraph 11 deals with the scientific examination both of suspected causes of diseases and of the remedies suggested. It was not, at the time that the Resolution of 1881 was written, foreseen how soon the aid of scientific experts could be called in, but it was intimated that this would be done as time went on. As a matter of fact, important action has been taken in this direction during the last twelve years. This was pointed out in the Resolution summoning the present Conference, in which it was explained that a system of scientific enquiry had been organized in those branches of investigation which were beyond the scope of the ordinary establishments, and beyond, it might have been added, the means and ability of the agricultural population itself to accomplish.

"With this object," it was stated, "there have been successively established the office of Reporter on Economic Products and the Civil Veterinary and Bacteriological Departments. The Departments of Meteorology and Geology already existed, but the attention of both has been called more distinctly than before to the work of practical investigation. At the same time the Trustees of the Indian Museum have consented to carry out through their staff enquiries connected with economic Entomology and Zoology, while the Botanical Survey, previously restricted to three Provinces, has been extended over the whole of India." It may be added that research in the field of economic and agricultural products has been thoroughly set on foot and already includes the completed compilation in a long series of volumes of all information obtainable to date on those subjects, while a comprehensive scheme for the investigation of cattle-diseases and the protection of agricultural stock against epidemics has been established.

18. Under all the heads named a programme has been framed for maintaining continuous and active investigation. But as the Resolution just referred to indicated—

"None of these departments or institutions were connected with agriculture proper, and from 1882 to 1888 representations were made to the Secretary of State that the scheme of enquiry could not be completed without an agricultural expert, who should organize and develop a system of agricultural investigation in those directions in which scientific control was wanted. In 1889, Dr. Voelcker was sent out to India by the Secretary of State—'to *advise on the best course to be adopted in order to apply the teachings of Agricultural Chemistry and in order to effect improvements in Indian agriculture.*' Dr. Voelcker's preliminary recommendations led to the appointment, in October last, of an Agricultural Chemist, who, with the aid of a laboratory assistant, appointed at the same time to teach in the Forest School at Dehra, will take the position of the expert asked for by the Government of India.

"His duties will be necessarily concerned with a larger field than that implied by the term 'Agricultural Chemistry,' and it is one of the objects of the present Resolution to indicate to some extent what the duties and functions of the Agricultural Chemist will be.

"In the detailed report now submitted Dr. Voelcker makes numerous recommendations in the direction of agricultural improvement and reform, many of which cover the same ground as those of the Famine Commission. His suggestions come indeed mainly within the scope of the programme set out in the Resolution of 1881, to the principles of which the Government of India still adhere as forming the basis of the scheme of agricultural enquiry and improvement: and, although his suggestions point, as did the Resolution of 1881, to the ultimate establishment of positive measures for improvement, they do so with the same proviso that 'before any real improvements can be effected in agriculture the institution of organized enquiry into existing methods is absolutely necessary.' The Government of India desire, therefore, that for the present the main duty of the Agricultural Chemist should be to take his place in the scheme of enquiry rather than to institute what may prove to be premature efforts in the direction of agricultural improvement."

19. It will be desirable at this point to recapitulate under brief heads the steps which have been taken or enjoined to secure the fulfilment of the Famine Commissioners' recommendations. I have advisedly used the words 'steps' as indicating measures which must be adopted in logical sequence—

(1) The organization of establishments for collecting agricultural facts and statistics.

(2) The organization of a system of supervising and training the establishments.

(3) The organization of a system of land-records to be maintained by those establishments.

(4) The careful examination of each agricultural tract by the special Departments' recorded facts and statistics provided by the land-records.

(5) The ascertainment of defects, if any, in each agricultural tract and their causes.

(6) The suggestion of remedies for defects in each case.

(7) The examination by experts of those cases in which defects and their causes or remedies require investigation.

(8) The application of remedies.

(9) The co-operation of the native community.

20. The present Conference has been convened to discuss under the light of Dr. Voelcker's report how the programme summarized in the preceding paragraph can be developed with the assistance of the Agricultural officer. Enough has been said to show that great progress has been made under the first three heads, and that under the next four much has been accomplished, though much still remains to be done. It is to these four measures and to one other not yet mentioned that our attention will have chiefly to be devoted. The eighth or the application

President's Opening Address—contd.

of remedies, must, so far as it appertains to positive agricultural improvement, proceed slowly for two reasons:—

Firstly, because precise investigations, including the analysis of agricultural tracts and careful experiment by or under the direction of scientific experts, must be continued for many years before any safe conclusions can be drawn as to what suggested improvements can be safely adopted.

Secondly, because the agricultural population must be made capable, by reforms in educational methods, of adopting and assimilating improvements.

The second of the two reasons which demand the deferment of positive agricultural improvement indicates the measure to which I have alluded as 'not yet mentioned.'

21. It is somewhat remarkable that neither the able and comprehensive report of the Famine Commissioners, wide-reaching as it was, nor the opening Resolution of the Government of India in 1881, appreciated or foresaw the difficulty of introducing any important improvements in agriculture until the agricultural population had been taught in the schools in such a manner as to enable them to assimilate and utilize information conveyed to them. It was left to Mr. Nicholson at the Madras Conference to point this out. The Resolution of 1881 in the 12th paragraph, already quoted, dwelt, it is true, on the necessity of securing the active co-operation of the native community, but omitted to notice the necessity of so training them as to enable them to give that co-operation. The proposition put before the Conference is that such training cannot be secured by agricultural and technical schools, though these may be brought into the educational scheme hereafter, but must be commenced by a material change in the general system of education—a change which, it is believed, has in some Provinces already been begun. This is on the whole the most important question which the present Conference has to discuss.

22. The subjects for discussion are given in further detail in the Circular summoning the Conference. From one point of view it is fortunate that the main objects at present in view are confined to agricultural enquiry and to agricultural education, and that positive agricultural improvement, as defined in paragraph 16, must, if the views put forward are accepted, be cautiously attempted, for the present financial condition of the Empire is not such as to admit of promoting large and expensive schemes of agricultural experiment, however promising they may appear to be on paper. This remark does not of course refer to expenditure on the practical improvements of a general character referred to in paragraph 15 which are already in full progress. Considerable sums are already being expended by the State in the public works, and in the administrative measures which the Famine Commissioners recommended as conducive to agricultural interest, or to the amelioration of the condition of the rural population; but whatever cry may be raised, and from whatever quarter, that positive improvement in agricultural practices should be hurried on, it will be wiser to postpone action involving large expenditure until the schemes of enquiry and education have been carefully worked out. For these reasons the questions brought before the Conference have been primarily confined to subjects connected with either the development of the system of agricultural research or the practical education of the agricultural classes. The question how far measures should be taken for the more direct improvement of agriculture is one which Local Governments and Administrations will be invited to consider.

23. One point must be remembered in our discussions. The Conference is not invested with any powers to lay down any authoritative programme. Its functions are confined to the suggestion of a general plan as general principles for the consideration in the first instance of Local Governments and Administrations. It is clearly that an uniform policy should, so far as this may be possible, be adopted throughout India for giving effect to the recommendations both of the Famine Commissioners and of Dr. Voelcker. It is equally evident that it would be presumptuous for the Government of India to impose its own views upon the Provinces and that the policy adopted must be based on their advice. One method of procedure would have been to call for the opinions of the Provincial Governments upon Dr. Voelcker's report and for the Government of India to have deduced a general policy from them. But this procedure would have resulted in protracted correspondence and in an almost impossible attempt to reconcile contradictory views and recommendations. The discussions of the Conference are intended therefore to define the issues upon which Local Governments will be asked to submit their opinions and to clear the ground for the adoption of a practicable and reasonably uniform policy throughout India.

APPENDIX III.

Notes by Members of the Conference and others on subjects discussed at the Conference.

(1)

Note by MR. W. C. MACPHERSON, *Offg. Director of Land Records and Agriculture, Bengal, on the Agricultural Ledger Series.*

Agricultural Ledger Series (Mr. Macpherson).

1. Under the orders of the Government of India, the Provincial Departments distribute, according to a prescribed list, copies of special agricultural reports, pamphlets, notes, etc.

2. These are the papers which will be ledgered. They should include extracts from Settlement reports, Administration reports, etc. *Agricultural Ledger Series (Mr. Macpherson)*—contd.

3. All these papers will find their way to the Office of the Reporter on Economic Products. I would suggest that it would be very useful that an index should be prepared every year in the Office of the Reporter on Economic Products, showing the papers which have been ledgered under every sub-head of the series. The Index may (1) be an annual index showing only new papers added during the year; or (2) it may be a complete index of all papers ledgered from the beginning. If course (1) be followed a complete index should also be periodically issued.

4. The important thing is that a person consulting the Ledger Series should be able to tell from the indexes that he has got all the papers containing information on a particular subject.

5. The papers as received should be numbered under each sub-head in the Office of the Reporter on Economic Products.

6. Perhaps the Reporter, or the Agricultural Chemist, would often add his own summary of the papers or his remarks. His contribution would of course be numbered and circulated.

7. The index may either be purely alphabetical, or it may be divided under the main heads appended to Revenue and Agricultural Department Circular No. 17—51, dated 4th May 1893. The sub-heads would follow in alphabetical order under each main head. Under each sub-head the papers would follow in order of date of publication. There would be cross-references. Thus under sub-head "Wheat" in the index reference might be made to "Saltpetre" for information regarding saltpetre as a manure for wheat.

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(2)

Note by Mr. E. B. Francis, *Director of Land Records and Agriculture, Punjab, on the progress made in agricultural improvement in the Punjab.*

In the Punjab one-tenth of the cultivated area is irrigated by canals which are the property of Government, and have in most cases been constructed by our Government since annexation, the principal being the Bari Doab canal irrigating about 600,000 acres, the Sirhind canal irrigating 700,000 acres, the Western Jumna canal irrigating 350,000 acres, the Swat River canal irrigating 100,000 acres, and the Chenab canal irrigating already 40,000 acres, an area which is rapidly increasing. *Agricultural improvement in the Punjab (Mr. Francis).*

The amount advanced by Government for agricultural improvements—that is to say, mainly for the construction of wells—averages three lakhs of rupees annually. There is no Government farm in the Punjab, but the Agri-Horticultural Gardens, Lahore, distribute considerable quantities of improved acclimatised agricultural seeds, some of which, especially various kinds of foreign cotton, of American maize, and of huskless barley, have become established in the Province. What is now wanted is sufficient land and a large enough agency to spread these improved seeds throughout every part of the Province to which they are adapted. Egyptian, Persian, and Arabian dates have been imported and freely distributed. Many thousands of fruit-trees have been distributed to hill districts from the orchards at Mahasu near Simla, and also to various districts from the Lahore Gardens. These include American and other vines. Superior kinds of English potatoes have been introduced into hill districts. Operations in regard to improved implements, water-lifts, etc., have been restricted by the small area of land available for experiments and the want of suitable agency, but I believe that much might be done if we had the means.

The Beheea Sugar Mill has become popular in Delhi, Gurgaon, Karnal, Umballa, Jullundur, Hoshiarpur, Peshawar, and most sugar-growing districts, though the shallow evaporating pan introduced by the same firm, Messrs. Thomson and Mylne, has not yet come into favour. Improved iron ploughs have taken here and there, but the great want of the Province in this line is, I think, some form of weeding implement which can be worked by animal power.

No distinct improvement on the Persian wheel as a water-lift has yet been introduced, but some useful pumps for short lifts, such as occur in raising canal and river water, are being tried.

For a general improvement in staples, improvement of seed is essential, and also some improvement of the system of local trade whereby a cultivator might be sure of getting a superior price for a superior product. This is a matter in which it is doubtful how far official agency can suitably be employed.

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(3)

Note by Mr. N. N. Banerjei, *Assistant to the Director of Land Records and Agriculture, Bengal, on the progress of agricultural improvement in Bengal.*

1. The following note may be read in continuation of Mr. Finucane's letter No. $\frac{1971}{1360}$ (Agriculture), dated 9th September 1890, printed with the notes of the Simla Conference of October 1890. *Agricultural improvement in Bengal (Mr. Banerjei).*

Agricultural improvement in Bengal (Mr. Banerjei) - contd.

2. The work done in the direction of positive Agricultural improvement in Bengal since the establishment of this Department in the year 1885 may be conveniently considered under the following heads :—

(*a*) Experiments in agricultural stations.

(*b*) Experiments in Wards' and Government estates, and through private persons.

(*c*) Sericultural experiments.

(*d*) Miscellaneous work done by the Department.

(*e*) Agricultural statistics and analysis of districts.

3 (*a*) *Experiments in agricultural stations.*—Three experimental stations have been established in Bengal, *viz.*, one at Sibpur near Calcutta at the expense of Government, the second at Burdwan at the expense of the Burdwan Raj, and the third at Dumraon at the expense of the Maharaja of Dumraon. The Burdwan and Dumraon stations were established in 1885, soon after the creation of the Bengal Agricultural Department, and the Sibpur Farm in 1887. The stations are under the direct management of resident overseers, who have been imported from the Cawnpore Farm, on a salary of Rs50 per mensem, and are supervised by Messrs. B. C. Basu and N. N. Banerji, Assistants to the Director. A brief notice of the chief lessons indicated by the experiments made at these stations is given below.

Crops.—Potatoes.

4. *First.*—Potato seed imported directly from England, or from hill stations (*e.g.*, Naini Tal) where such seed has been acclimatized, yield a heavier outturn and outturn of a better quality than that obtained from seed of country varieties. The imported tubers are also hardier, and can better resist the effects of drought and inundation.

Second.—High cultivation and liberal manuring prove profitable with the potato crop.

Third.—Mixtures of cow-dung and castor-cake, and of cow-dung and bonemeal, prove profitable and yield better results than any of these manures used singly.

Fourth.—Green manure judiciously applied gives excellent results with the potato crop.

Sugarcane.

First.—Planting sugarcane in straight and parallel trenches, as is done in Mauritius and other sugarcane-growing countries, is more profitable than the method so commonly adopted by cultivators in many parts of these provinces of sowing in irregular plough furrows.

Second.—Certain varieties of sugarcane (*e.g.*, the *khari* variety) may be grown (*ratooned*) with profitable results year after year for several years from the previous year's *stools*.

Third.—A mixture of castor-cake and bonemeal forms an excellent manure for sugarcane and generally gives a larger outturn than either of these manures used singly.

Fourth.—Crude saltpetre is a profitable manure for irrigated sugarcane.

Paddy.

First.—A mixture of bonemeal and saltpetre proves a profitable manure for the winter paddy crop.

Cotton.

First.—The *khaki* coloured variety of cotton, known as Nankin cotton, yields generally better results than some American varieties.

Second.—The Garo Hills variety of cotton grows well on ordinary alluvial soils, and yields cotton with a high proportion of lint.

Wheat.

First.—Crude saltpetre is an excellent and profitable manure for irrigated wheat.

Second.—Green manuring with hemp gives good results with wheat.

Third.—The outturn and quality of wheat may be improved by introducing better varieties of wheat than those locally grown.

Oats.

First.—Oats can be easily grown in Lower Bengal, and as a rule succeeds better than wheat or barley.

Fodder crops.

First.—Grasses, such as *Sorghum saccharatum*, *Sorghum vulgare*, and *Reana luxuriana*, can be grown profitably and without much trouble in Lower Bengal as fodder for cattle.

Second.—The outturn of *Sorghum saccharatum* can be profitably increased by the application of bonemeal.

Tobacco.

First.—Havana tobacco can be easily raised in Bengal.

Dhainchi (*Sesbania aculeata*).

First.—This is an excellent preparatory crop for cereals like oats and barley.

Ploughing.

First.—A soil-inverting plough like the Sibpur plough is superior to the country plough for breaking up new land. The latter acts very well when following the former, as it does the work of a grubber breaking up the clods, which are apt to form from the furrow slices turned by the soil-inverting action of the Sibpur plough.

Second.—A plough which inverts the soil gives a larger outturn of wheat and paddy than one which, like the ordinary country plough, breaks the soil without inverting it.

Manures.

First.—Dung and urine may well be conserved in pits lined with bricks in order to prevent soakage. If the weekly accumulation of dung, urine, and refuse straw be mixed up thoroughly with a *kodali* and stamped down by the feet, very little of the valuable constituents can be lost.

Silage.

First.—Grasses growing rank and becoming uneatable by cattle, can be easily and usefully converted into palatable fodder as silage.

5. In order to demonstrate some of the above results on a practical scale, two Model Farms have been recently established under the supervision of this Department, *viz.*, one at Dumraon, and the other at Mainaguri in the Jalpaiguri District.

6. (*b*) *Experiments in Wards' and Government Estates, and through private persons.*—*Experiments in Wards' and Government estates.*—Numerous experiments are made in Bengal in various Government and Wards' estates. Under arrangements made between this Department and the Board of Revenue, the latter provide small sums in many of these estates for the conduct of experiments and improvements. Most of these experiments are of a petty nature, and receive little or no supervision from this Department. In only a few places like the Western Duars in Jalpaiguri, Jheria in Manbhum, Modhupur in Cuttack, Dighapatia in Rajshahi, and a few others, are the experiments of a sufficiently important character to call for direct supervision by the officers of the Department. It may be said here that, generally speaking, few local officers and managers of estates take an active interest in agricultural experiments and improvements, and to this cause may be attributed the failure of the majority of experiments carried out in these places. The two agricultural officers of this Department are helped in supervising the experiments in Wards' and Government estates by two travelling overseers, on salaries of R40 and R25, respectively.

Private farms.—Several private individuals have sought the advice of this Department in managing their cultivation. Foremost among them is Mr. B. Pal Chowdhry, a wealthy zemindar and indigo-planter of the Nadia District, who has established a home farm of some 300 bighas of land in his country seat at Natuda. Two others are Mr. N. C. Boral, an attorney of the Calcutta Bar, and Babu Chandra Nath Chowdhry of Chatkabaria in the district of the 24-Parganas.

7. (*c*) *Sericultural Experiments.*—In the year 1886, in consequence of suggestions madeby Mr. Wardle and others interested in silk, enquiries were made to ascertain the cause and decline of the Bengal silk industry. As the result of these enquiries, it was stated that the main cause of the decline of the industry was the spread of disease among silkworms. Steps were taken by Government to provide measures for eradicating the disease, and the services of Mr. N. G. Mukerji, a silk expert, were lent to the Bengal Silk Committee for this purpose. Since the middle of 1891, however, Mr. Mukerji has worked under the control of this Department, and the whole cost of his pay, etc., has been borne by Government. A central laboratory is maintained at Berhampore, and rearing stations have been established at Kalimpong, Pakhuria, Khulna, Baluakhali in Jessore, and Kagachira in Malda, the experiments at all these places being conducted with a view to eradicating disease and producing healthier seed.

Aid was given last year in the shape of a grant from the funds of this Department to silk experiments conducted at Alipur by Messrs. J. A. Anderson and R. A. Lyall of the Silk Committee.

8. (*d*) *Miscellaneous work done by the Department.*—1*st*, Efforts have been made by this Department to popularize the cultivation of Buxar wheat and of hill potatoes, and large quantities of seed of these crops are supplied annually by this Department to private parties and to Government and Wards' estates for the purposes of experimental cultivation. The cultivation of Buxar wheat has shown that satisfactory results can be obtained with this variety of wheat only in certain parts of Bengal. The eastern and south-eastern districts of Bengal have been found unsuited to Buxar wheat, samples of produce from most of the places where experiments were made having been reported on by the Committee of the Wheat and Seed Trade Association to have lost all the characteristics of Buxar wheat. On the other hand, samples from

Agricultural improvement in Bengal (Mr. Banerjea)—contd.

some parts of Northern Bengal have been favourably appraised. It has also been discovered from the reportsof experimenters that Buxar wheat is more exacting of manure and irrigation than the local varieties cultivated in Bengal, and that where the crops have been well manured and irrigated favourable results have been obtained. Hill potatoes have generally given good results, and there is a gradually increasing demand for seed tubers of seed grown in the hills. Last year the amount of wheat seed distributed was 140 maunds, and that of potatoes 180 maunds. Besides these, cuttings of improved varieties of sugarcane, improved seed of jute, paddy, oats, barley, and other crops, as well as manures, such as bonemeal and saltpetre, have also been supplied on payment of cost to Wards' and Government estates and to private parties.

9. *2nd, Introduction of improved implements.*—The question of supplying Bengal raiyats with an efficient and cheap plough has occupied the attention of the Department since its creation. Several new soil-inverting ploughs provided with iron mould-boards were invented and brought to the notice of the public by the Department. Among these, the Burrakur cast-iron and Sibpur wrought-iron ploughs have been more favourably reported upon than any others. The Burrakur plough was made at the Burrakur Iron Works by the Superintendent under the instructions of officers of this Department. During the first three years 1,273 of these ploughs were sold, but though acknowledged in most quarters to be an improvement on the native implement, the plough failed to be popular on account of its weight and material The Sibpur wrought-iron plough was invented and perfected by Mr. Ambica Churn Sen while he was connected with this Department. Its efficiency is generally acknowledged, but it is objected to by raiyats on account of the heaviness of its draught, and the demand for it is consequently not very great. A few Beheea three-rollered mills and chain pump lifts have been supplied on application by this Department to Wards' and Government estates and private individuals.

10. *3rd, Introduction of valuable trees.*—Efforts have been made by this Department with the aid of Dr. King, Superintendent of the Royal Botanical Gardens, and of the Agri-Horticultural Society of India, to introduce the edible date-palm into the drier parts of Bengal, the divi-divi (*Cæsalpinia Coriara*), the pods of which yield a valuable tan, into the Sonthal Parganas, the *Eucalyptus* into Hazaribagh, *Casuarina* trees into Puri, valuable timber trees such as teak and mahogony into Rajshahi, and fruit trees, such as the apple, pear, plum, peach, orange and the grape-vine, into Hazaribagh. The efforts of the Department have not been very successful in this direction.

11. *4th, Utilization of bones as a manure.*—An attempt is being made to popularize the use of bone-manuring in Bengal. For this purpose, the manufacture of bonemeal has been introduced as a jail industry at the Jailpaiguri, Chapra, and Darjeeling Jails. It is found that bonemeal can be made by means of the native *dheuki* at a much cheaper cost than what it is sold for by the Calcutta mills, and the crushing is rendered much easier by a previous process of fermentation in pits with the help of dung, urine, ashes, and lime, etc. Large quantities of meal made at these jails have been sold to the tea and indigo planters in Jalpaiguri and Darjeeling. Two gentlemen—Mr. Stalkartt of Hopetown, Sonada, and Mr. Thomson of the Goodhope Tea Estate, Jalpaiguri—have purchased large quantities of bonemeal from the Jalpaiguri Jail and found it useful, and there is a likelihood of the manure becoming ere long popular in tea gardens. Numerous experiments have been made in order to induce raiyats to take to the use of bonemeal, but although in several cases good results were obtained by raiyats from the experimental use of bonemeal, no raiyat has as yet come forward of his own accord to use the manure. Experiments have also shown that bone ash, which is easier of manufacture and not more expensive than bonemeal, is a very good manure even on soils on which the use of bonemeal has failed to produce any effect.

12. *5th, Establishment of a Veterinary Institution and improvement of the Bengal breeds of cattle.*—The scheme for the establishment of a Veterinary Institution to provide an agency through which Government can take action in the matter of the improvement of cattle, and the prevention of cattle-diseases, has been successfully developed with the assistance of munificent donations from Babu Sheo Buksh Bogla of Calcutta and Sir Dinshaw Manokji Petit of Bombay. Veterinary Captain Gunn, who has been appointed Superintendent of the Civil Veterinary Department, Bengal, has been placed in charge of the Institution, which will shortly be opened. The Institution provides for the accommodation of fifty students, who will undergo a thoroughly practical course of instruction in equine and bovine pathology.

13. During the last few years, efforts have also been made by this Department, pending the establishment of the Institution, to improve the breed of cattle by supplying good up-country bulls to jails. Favourable reports have generally been received of the stock got by the bulls, but it is doubtful whether they have produced any very marked improvement on the local breeds of cattle.

14. *6th, Emigration to Burma.*—The question of relieving the surplus population of overcrowded districts engaged the attention of the Directors of the Agricultural Departments at a Conference held at Delhi in the year 1888, and it was then found desirable to promote emigration to Burma from the congested districts of Behar. Steps were taken to acquire land under favourable circumstances for Behar capitalists, the Agent of the Maharaja of Dumraon obtaining a grant of 10,000 acres of land, and arrangements were made by Government with the British India Steam Navigation Company to carry emigrants to Burma at a reduced passage rate of ₹5 instead of ₹10 in consideration of a subsidy of ₹2-8

a head paid by Government. Recruiting agencies were opened in various parts of the tracts to be relieved, and the first batch of emigrants collected by the Agent of the Dumraon Raj left for Burma in June 1891. Up to the end of the year 1891-92, the total number of emigrants from Behar was 105. Last year the number rose to 313, consisting of 191 adults, 89 children, and 33 infants. It is reported by Mr. Mackay, who has taken an active interest in the scheme, that the movement is becoming popular and will doubtless spread. Several men of the first batches of emigrants have returned to their homes with their families and friends, and speak well of the country visited by them and their prospects. The Beharis have been found unable to compete with Madrasi coolies employed in factories in towns, but they do better as agriculturists. *Agricultural improvement in Bengal (Mr. Banerjea)*—contd.

15. *7th, Agricultural Exhibitions.*—This Department has pecuniarily and in other ways encouraged the efforts of private societies and individuals to hold agricultural exhibitions as a means of educating the agricultural classes. The exhibitions are annually growing more popular among the agricultural classes and are increasing in number. Advantage is taken of them to demonstrate the working of improved implements and machines, to exhibit improved products obtained from experimental farms, and to distribute pamphlets and notes prepared by the officers of this Department, both in English and in the vernacular, on the results of agricultural experiments conducted on the farms under the Department, on improved methods of cultivation, and on the use of manures and improved implements.

16. *8th, Agricultural statistics and analysis of Districts.*—One of the chief duties of the Department has been the compilation and publication of estimates and forecasts relating to rice, wheat, jute, oil seeds, cotton, to the important *bhadoi* and *rabi* crops, and the compilation of returns of agricultural statistics relating to areas under cultivation, prices of commodities, incidence of land revenue, and varieties of tenures. Although from the want of adequate agency for the collection of such statistics in Bengal, these returns cannot lay any claim to strict accuracy, they have proved useful in giving approximate ideas of the extent of cultivation, of the amount of exportable surplus, which has been found useful to the mercantile community, and of the land system prevailing in these provinces.

17. *Analysis of Districts.*—The officers of this Department have also prepared useful reports on the agriculture of four districts of these provinces, *viz.*,—Burdwan, Dacca, Lohardagga, and Cuttack.

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Note by MESSRS. H. Z. DARRAH, *Director of Land Records and Agriculture, Assam, and* E. A. GAIT, *on special duty, Assam, on the subject of District analysis in Assam.*

With reference to Resolutions II and III, on page 9 of the Proceedings, we think it should be placed on record that, as far as Assam is concerned, there are large areas for which no abstract of village facts or statistics would be of any value whatever. These are tracts consisting of villages, the whole or greater part of the cultivation of which is fluctuating, where in one year a large area under crops would be shown and the next year there would be nothing but waste. For such villages any abstract of the statistics would be misleading; for though the figures would denote a very sudden and serious deterioration in value, the change would nevertheless be only a normal one and need give rise to no alarm. For the real fact would be that no calamity had occurred, but that the land having been used for some years was considered no longer worth cultivating, and was consequently abandoned. This is a state of things which occurs in a large number of villages in Assam. It might be said that these villages would be known to the local authorities, and that the figures would be understood and would cause no anxiety. This is, of course, correct, but it is possible that confusion might arise between villages as to which the alterations in figures mentioned above would indicate no deterioration and those in which such changes would mean very serious loss. Therefore it should, we think, be free to the Local Government to select the tracts for which the abstracts of village statistics are to be prepared, and to direct in what tracts nothing in this direction should be done. Therefore we think the Resolutions referred to go a little too far in saying that where agricultural statistics are compiled, some system should be adopted under which the leading facts and statistics should be abstracted. In Assam such abstracts would only be of utility in certain specified tracts. *Agricultural analysis (Messrs. Darrah and Gait).*

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Note by MR. E. B. FRANCIS, *Director of Land Records and Agriculture, Punjab, on Agricultural analysis.*

In the Punjab a monograph has been drawn up annually for the last ten years upon some one important industry under the direction of the Financial Commissioner. The enquiry has been made by a selected officer with the aid of reports from district officers. In these monographs a great deal of valuable information has been brought together in a very convenient form. We have now proposed that we should go on to deal in a similar way with various agricultural subjects, taking up one or two each year. All available information would be collated by a selected officer, European or Native, under the supervision of the Director of Agriculture. A series of monographs might be written on the more important crops of the Punjab. Something of the sort was actually done some time ago, in the matter of *maize*, and another compilation was made *Agricultural analysis (Mr. Francis).*

Agricultural analysis (Mr. Francis) —contd

of information regarding *wheat*. Besides the series of crops, we might choose for similar enquiry such subjects as water-lifts, tillage implements or processes, harvesting processes, grain storage, ensilage or hay-making, breed of cattle, dairy work, etc. etc. On most of these subjects something has already been written. The Agricultural Chemist might advise us as to the method on which our enquiries should be conducted and the monographs compiled. The Punjab members are now glad to find that our Programme for this Province as above described will fit in well with the view which appears to be held by the Conference that the agricultural enquiry should proceed by subjects and not by local areas, or, to express it otherwise, that it should take the form rather of a ledger series than of a gazetteer. We have our own proposals regarding the compilation of a Provincial Gazetteer of Agriculture in which the plan would be according to districts or other local areas, and comprise the whole field of agricultural practice in each, but the subject now under discussion is the mode in which the Agricultural Chemist can co-operate with the Provincial Agricultural Departments, and it is mainly in that part of the enquiry which will proceed by subjects that we can work together.

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(6)

Note by Mr. B. C. Basu, *Assistant to the Director of Land Records and Agriculture, Bengal, on the compilation of a Gazetteer of Agriculture.*

Agricultural Gazetteer (Mr. Basu).

1. It is proposed to entrust the duty of compiling a gazetteer of existing agricultural methods to the Agricultural Chemist. It will involve the collection and collation of facts and statistics contained in gazetteers, settlement reports, and other such sources of information, and to require both personal investigation in the field and continual communication with the officers of the Agricultural Departments.

2. As far as the existing sources of information regarding economic products, their cultivation or manufacture, their consumption and exports, etc., are concerned, Dr. Watt's Economic Dictionary has probably left very few that can be laid under contribution, but in two respects the Dictionary is either deficient or ill-adapted as a book of reference on agricultural subjects. These are—

(1) That many subjects of agricultural importance—*e g.*, the different processes of tillage, irrigation, conservation and change of seed, the utilization of night-soil, drainage and embankments, etc.—do not directly fall within the scope of the Dictionary, and have not therefore been touched upon or only incidentally referred to.

(2) That much of the information on agricultural subjects given in the Economic Dictionary is more or less imperfect and generally undigested. That it is so, is no fault of the Dictionary. The information it sets forth is after all second-hand, and it would be scarcely an error to say that there are very few agricultural subjects in India which have been subjected to a complete, systematic and (I may say also) scientific study, and on which complete and reliable information is available. A few subjects of comparatively minor agricultural importance, such as *ganja* and tea, have been studied with a thoroughness that leaves little to be desired: it is desirable that subjects of far greater importance should receive proportionate attention. If we turn to the article on Rice in Dr. Watt's Economic Dictionary we will find an enormous amount of information about the cultivation of the staple in different districts in each province. To be made practically useful, all this information should be systematised,—that is, given in order under each head of cultivation, the differences in practice between different districts being traced to the varying causes of climate, soil, influences of race or caste, and other causes. It will not be enough merely to group the different classes of rice as *aus*, *aman*, or *boro*, but information should be given as regards each distinct variety, its characteristics in respect of cultivation and growth, its quality as judged by size, colour and digestibility, and its merits as compared with those of others which are grown in the same situations. I would have each important agricultural subject taken up and studied in all its bearings as thoroughly as our resources will permit. I believe in seeking such information we shall have to depend more on practical enquiry in the field and the laboratory than on the existing records of Government.

3. I would suggest that a definite programme should be laid down, setting forth the different subjects of enquiry to be taken up in order, and that when a certain subject has been taken up, the Agricultural Chemist might be asked to prepare a list of the heads under which information is wanted, to consult and draw upon all available sources of information, and where these fail, to supplement them by scientific investigation conducted by himself and his assistant, and personal enquiry in the field made by officers of the Agricultural Departments. Mere official enquiry through the medium of local Revenue officers would succeed in eliciting little useful or reliable information, at any rate in Bengal; and in every case in which information will be called for from Provincial Departments for the purposes of the gazetteer, Agricultural officers should be deputed to collect it by actual enquiry in those places where the information can be had first-hand. If we were to call upon district officers for information about varieties of rice, for instance, we would no doubt be furnished with returns exhibiting a bewildering array of names, with probably some attempt at describing their characteristics, some being defined as red, large, and growing in deep water, others white, fine and short-stemmed, and so on; but information of this character is as little useful as it is reliable. We would have no means of identifying the varieties of one district with the same varieties grown in

another, but known by different names, of comparing their relative merits or their adaptability to particular conditions of climate and soil, and of knowing a host of other particulars, which one must know before coming to a decision as to the possibility of improving the cultivation of rice. In collecting information about rice,—that is, so far as it can be had by field enquiry and observation, the Agricultural Department in each important rice-growing province should depute one of its officers to select typical areas in each of its geographical divisions, where he should try to collect as much reliable information as is relevant to the subject, and verify the statements of cultivators, and others, by independent observation. In this way, and in this way alone, can information about the existing agricultural practices of the country be obtained, which cannot be challenged for accuracy, should be good for all times, and may eventually lead to improvements. *Agricultural Gazetteer (Mr. Basu)*—contd.

4. The system of recording agricultural information derived from numerous sources in small leaflets, and arranging these in ledger form for facility of reference, has been recently introduced by the Government of India. The duty of arranging and, when necessary, of compiling the leaflets has been entrusted to the Economic Reporter to the Government of India This work may be allowed to go on *pari passu* with the compilation of the Gazetteer, but it may be transferred from the Economic Reporter to the Agricultural Chemist, who will be the fittest person to undertake it.

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(7)

Note by Mr. W. C. Macpherson, *Director of Land Records and Agriculture, Bengal, on the question of providing agricultural experts in the various Provinces.*

1. We have been asked to state what is the staff of experts required in our Provinces both to advise and direct and also to fill the posts of managers of experimental farms; also to say how this staff should be provided. *Agricultural expert staff (Mr. Macpherson).*

2. I have first to state that in Bengal the Department has three agricultural experts of a high status, all graduates of the Calcutta University and of Cirencester College. One of these, Mr. Nitya Gopal Mukherji, is entirely occupied with experiments and enquiries directed towards combating silkworm disease and producing healthier "seed." The other two officers, Messrs. Bhupal Chandra Basu and Nagendra Nath Banerji, are employed partly in the supervision of the three experimental farms at Sibpur, Burdwan, and Dumraon, and in supervision of the experiments (chiefly in growing new staples or improved seed) in Wards' estates and Government estates and in distributing improved seed; and partly in compilation of agricultural statistics and forecasts in the Director's Office. In the second branch of work, Messrs. Basu and Banerji under the Director's supervision attempt to do for Bengal what Major Craigie does for the United Kingdom. The statistical portion of their duties takes up so much of their time as to prevent them from giving the careful attention to the management of the experimental farms (*e.g.*, especially at the manuring and weighment seasons) which is essential for a satisfactory record of the experiments. To my thinking a really efficient Agricultural Department in Bengal would require to have nine officers of the status of Messrs. Basu and Banerji,—that is, an officer for each Commissioner's division, or on an average one officer for five districts or 15,000 to 20,000 square miles. These are the officers who should do the work of making the agricultural analyses of the districts of Bengal and who should record the existing agricultural methods and practices. They should belong to the Provincial service of Deputy Collectors. I do not entirely agree with Dr. Voelcker that it would be a matter for regret that these officers should pass after a time into the regular line. From our point of view it seems to me to be an excellent thing that an officer like Mr. Ambica Charan Sen should come to be the head of a district. A Collector has great powers of good in his district and might be able to do much to improve agricultural practice. The supply of experts like Mr Basu and Mr. Banerji in Bengal has ceased with the extinction of the Bengal Cirencester scholarships and by the limits which financial reasons impose upon the number of such experts who can be paid by Government.

3. For the management of the experimental farms or stations a lower grade of experts is required to work under the experts of the higher grade. We pay our present farm managers R50 a month. All the three managers have been imported from the Cawnpore farm. There is no indigenous supply of such men. If a demand should be created for them by establishment of more experimental stations and farms I have little doubt that Bengalis would qualify themselves for such posts and would go through the necessary courses of study at Poona or in Bengal if a training school should be provided. They would accept less than R50 a month, I think, to begin with, *e.g.*, as probationers, if they had prospects of getting into the higher grade of experts hereafter. I look forward to a time when every district in Bengal (3,000 square miles) will have at least one experimental farm or station. For the present, however, I see little prospect of largely increasing the number of experimental farms and stations; and if more money were at once forthcoming I would prefer that it should be spent in Bengal in paying another officer of Mr. Basu's class and in more careful management of the farms we have rather than in establishing more farms. I say nothing here about the need for training agricultural teachers (who might properly be included in the class of experts) because the extent to which agriculture is to be introduced into the departmental system of education has yet to be determined. So with regard to insisting on some knowledge of agriculture being required from our future Land-Record keepers and Land-Record Inspectors. It is premature in Bengal to say anything on this subject; but I should personally be in favour of requiring such a qualification.

(8)

Note by MR. J. O. MILLER, *Director of Land Records and Agriculture, North-Western Provinces, on the Agricultural expert staff in those Provinces.*

Agricultural expert staff (Mr. Miller).

1. It is impossible to carry out Dr. Voelcker's programme for Agricultural enquiry in the North-West Provinces without the provision of a trained expert staff. At present the Assistant Director, who is a member of the Statutory Civil Service, and has been trained at Cirencester, is the Director's technical adviser on agricultural matters, but a part of his time is taken up with Land-Record work, from which it is, under present arrangement, impossible to set him free.

2. I think it is essential that the agricultural work of the Department, including agricultural enquiry generally, and the conduct of experimental farms should be directed by a trained Agricultural expert, devoting his whole time to the work; and not looking for promotion outside the Department. This trained expert should in my opinion be a European. The cases will be rare in which native officers capable of efficiently supervising the whole of the agricultural work of the Department are forthcoming; and at present in the North-West Provinces our only trained natives are members of the Statutory Civil Service, and look to the ordinary line of that service for their promotion. The Assistant Director on the Agricultural side of the Department should understand that his future prospects depend entirely on his success in agricultural work.

3. There is only one Government experimental farm in the North-West Provinces at present, but the question of opening one in Oudh was recently mooted, and in several districts there are private experimental farms in the management of which the owners would probably be only too glad to consult the expert Assistant Director. There would be ample work for him in inspecting and advising in the management of these farms, and in dealing with the agricultural work of the Department generally; the greater part of which, as far as office work goes, falls at present on the Director himself, as the native assistant finds his time fully occupied in the management of the farms, usar reserves, etc., and routine correspondence.

4. The expert Assistant Director would require, either at once or in course of time, one or more assistants as Agricultural Inspectors. Their number would depend very much on the extent and number of the subjects taken up for enquiry. Men of the class we have recently obtained from Saidapet for our Agricultural School would do admirably for such work. We cannot hope to get such men in the North-West Provinces on a salary of less than ₹50 per month, and I doubt if even this sum would tempt men who have been educated at Poona and Saidapet unless hopes of fairly rapid promotion were held out; and we could not hope to get really good men unless there was at least one post in the Department on high pay and to which they could aspire.

5. There has been some discussion about the agricultural education of Revenue Inspectors or Kanungos. I doubt the advisability of making these men into highly-trained Agricultural experts; and it is certainly impossible to attempt this at present. All we can aim at at present, is to introduce into the ranks of our Revenue Inspectors a number of men whose education has led them to take some interest in agriculture, and I hope we shall gradually attain this end through the medium of the Agricultural School we have recently opened, as well as by the opening of Agricultural classes in our schools.

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(9)

Note by Mr. E. B. FRANCIS, *Director of Land Records and Agriculture, Punjab, on the expert staff required in the Punjab.*

Agricultural expert staff (Mr. Francis).

The Punjab possesses at present no agricultural staff whatever. I consider that the appointment of an agricultural expert as Assistant to the Director of Land Records and Agriculture is most essential for the further progress of agricultural enquiry and improvement. It might be possible to meet part of the cost of such an appointment, as Mr. Wilson has suggested, from Courts of Wards' estates, who would certainly derive immediate benefit from the services of such an official.

I do not think that in the near future any more agricultural establishment will be wanted; but if an experimental farm were established, that institution would, after five or six years' experience, require to be backed up by some half-dozen demonstration farms, each of which would require a trained agriculturist as manager on pay of about ₹50 per mensem.

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(10)

Note by MR. E. C. OZANNE, *Survey Commissioner and Director of Land Records and Agriculture, Bombay, on the Agricultural staff existing and required in Bombay.*

Agricultural expert staff (Mr. Ozanne).

In Bombay, Mr. Mollison, M.R.A.C., is the only Agricultural expert at present employed as such. Besides his duties as Superintendent of Farms, he lectures on Agriculture to the students of the Agricultural Class of the College of Science and gives practical instruction on the farm. Another expert, Mr. P. P. Mehta, M.R.A.C., who was a diplomate of the Madras Agricultural College before he entered the Royal Agricultural College, was till recently employed as Superintendent (pay ₹250) of a Government farm. He has now been transferred

to the Survey and Settlement Department in order that he may qualify for the post of Divisional Inspector, Land Records and Agriculture. For the management of farms Superintendents are available from among the passed students and diplomates in Agriculture, provided that they are further qualified in practical knowledge by apprenticeship on a farm. At present there is only one Government farm, but another is being established to take the place of the Bhadgaon Farm, which has been sold. There is no other agricultural staff in the Presidency. In the ranks of the Kanungos there are some few passed agricultural students, but though the agricultural element in this staff is greatly to be desired, the existing inducements are so insufficient that an inferior class of men only is attracted by the University diploma, and even for those who take the diploma there is little chance of Government employment. In the Baroda State the Professor of Agriculture and Botany, Mr. Middleton, has also an experimental farm. The Baroda College is affiliated to the University for the purpose of the diploma. Diplomates in Baroda are entitled to claim employment in the Revenue Department, some of the best on appointment receiving pay as high as R60. It is most desirable the higher ranks of the Revenue Department proper should include a material proportion of men who have had an agricultural training, but they can only be secured by much greater inducements than those now afforded to the best students to take up Agriculture at least as an optional subject, to fit them for appointment in the regular Revenue line. This point is very sufficiently dealt with in the proceedings and in Dr. Voelcker's report.

Agricultural expert staff (Mr. Ozanne)—contd.

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(11)

Note by Mr. H. F. Clogstoun, *Commissioner of Revenue Settlement and Director of Land Records and Agriculture, Madras, on the Agricultural staff existing and required in the Madras Presidency.*

The existing agricultural staff in the Madras Presidency is shown in the margin. It is additional to the Director, who is a member of the Board of Revenue. This staff will suffice for the present needs of the Presidency and will be employed in the management of the five school and experimental farms which the Madras Government proposes to establish, but the opening of which has been deferred in deference to the wishes of the Government of India pending the consideration of Dr. Voelckers' report.

Agricultural expert staff (Mr. Clogstoun).

One officer on Rs. 750—50—1,000.
One do. on Rs. 200—10—250.
Four officers on Rs. 50—20—150.

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(12)

Note by Mr. E. C. Ozanne, *Survey Commissioner and Director of Land Records and Agriculture, Bombay, on the duties of the Agricultural Chemist.*

1. I hope we may take it as settled that the recommendations made by the last Conference should be fully affirmed by this as regards the duties and position of the Agricultural Chemist and the Assistant Agricultural Chemist. These recommendations were made after very full discussion, and have been elaborated by Dr. Voelcker in his report, which, it seems to me, should be looked on as the Manual of the Agricultural Department in questions concerning agricultural enquiry, experiment and improvement, as well as agricultural education. I for one am able to accept Dr. Voelcker's recommendations in their entirety on these points, and I move that this Conference should now so accept it.

Duties of Agricultural Chemist (Mr. Ozanne).

2. It seems now the time to formulate the rules referred to on page 12 of the proceedings of the last Conference.

3. It was considered in 1890 premature to lay down "any conditions as to the selection of special districts for close study." It seems now the time to specify these conditions.

4. Our Agricultural Chemist is with us. He has had a year of local study, and though for the reasons given by the President in the remarks which he has just made, the Conference could not be convened earlier, the time has not been lost. Dr. Leather must learn the agriculture of India before he can be an Indian Agricultural Chemist. It is not, I think, part of his duty (I make this remark with reference to the conversation at this Conference on Monday afternoon) to make any agricultural enquiry, *i.e.*, enquiry into existing methods of agriculture, except for his own information or directly in connection with any special subject which he may take up for his scientific study.

5. A general, though somewhat untrustworthy, account of local agriculture in each district or province is now available to him in various publications, *viz.*, Provincial Gazetteers, Wallace's India, Voelcker's Report, Watt's Dictionary, and more detailed accounts in Settlement Reports and publications of a special nature, some of which are referred to in the VIth Resolution at the foot of page 2 of the proceedings of the Conference of 1890. These he will use at his leisure or in connection to his tours. But agricultural enquiry into existing agricultural methods and practices must devolve on Directors with their assistants and agricultural experts.

6. The first step to be prescribed is, I think, that Dr. Leather should visit existing experimental farms. He has thoroughly visited Cawnpore. He should now visit Nagpore, and then Poona, and then Madras. If he stays, say, a couple of months in each of these provinces this year, he will give each farm a great deal of assistance. He will know what each farm can

Duties of Agricultural Chemist (Mr. Ozanne)—contd.

do, and will help to institute on the farms a commencement of enquiry into the problems which are most pressing in the neighbourhood of these farms. Thus to speak for Poona, the problems most urgent are—

(1) the study of the feeding of, and feeding stuffs for, dairy cattle. He may assist the local enquiry into this matter and should certainly fully know what is being practically tested by enquiry and experiment now under Mr. Mollison, the Superintendent of Farms, Bombay.

(2) the most economical system of manuring sugarcane. I am confident that his study will prove that the present available supply of manure can be by more judicious use made to supply a far larger area of cane than it now does.

7. In these two important enquiries any improvement shown useful will be immediately imitated. The enquiry can be systematized and carried out on the farm and then demonstrated. In both these enquiries, though Poona may be the *locale*, the results can, *mutatis mutandis*, be generally made useful to the whole of India. I think that no place in India can offer the facilities for the enquiries which Poona can. At Poona *both* enquiries can be taken up *at once*, and for the general conduct of both there is a fully competent agricultural expert of experience available, and there is the Laboratory at hand. Dr. Leather will have to visit Poona from time to time, but these visits will not monopolise his time. I say that two months now, in January and February, will suffice. But in the rains Dr. Leather may need to visit Poona again.

8. I have no doubt that both at Nagpur and Madras similar enquiries may be set on foot, so that three provinces will be served in one year. The North-Western Provinces has had a whole year, and I think that the Punjab, Bengal, and Assam will be content to wait for one year. Once this tour of India has thus been made, Dr. Leather will be in a position to know where his visits are most needed and where and what enquiries are most important.

9. I trust it is not presumptuous to ask for this programme. Other provinces have not the facilities for Dr. Leather's study so ready to hand, and meanwhile other provinces may still refer to the Agricultural Chemist for advice, or for analyses through his assistant. All this presupposes that Dr. Leather should have the completest command of the services of his assistant. In one respect only, as decided by the last Conference, can the assistant, without detriment to his principal duties, be otherwise utilized, *i.e.*, in the teaching of Agricultural Chemistry at Dehra and Poona. I trust that this will be fully admitted. If as analyst there is other work for him to do, the duties of the Assistant Agricultural Chemist as analyst should be devoted primarily to analysis in connection to Dr. Leather's enquiries on Agriculture, and secondarily to other enquiries.

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(13)

Note by Mr. B. C. Basu, *Assistant to the Director of Land Records and Agriculture, Bengal, on the system to be adopted in arranging for the analysis of soils, water, manure, etc.*

Analysis of soils, water, manure, etc. (Mr. Basu).

1. It is understood that all analytical work is to be undertaken by the Agricultural Chemist to the Government of India and his assistant. The scope of scientific investigation by these officers is sketched out by Dr. Voelcker in paragraph 419 of his report. It includes among others the following subjects:—

(1) Exhaustion of soil by the existing mode of cultivation, and the expert system (by which the sale of crops off the farm is probably meant);
(2) chemical quality of different soils, including alluvial and special soils, like the black "cotton" soil;
(3) nitrogen in rainfall;
(4) assimilation of atmospheric nitrogen by the *Leguminosæ;*
(5) *usar* soils and their reclamation;
(6) comparative merits of canal and well water for irrigation;
(7) composition of various manurial substances, and their applicability to particular crops, including new substances which are not as yet used as manure;
(8) conservation of manure;
(9) composition of food products and of fodder crops;
(10) composition of butter and ghee, etc.;
(11) causes affecting outturn of sugar; and
(12) enquiries in connection with the cultivation and manufacture of indigo, tea, coffee, and tobacco.

The enquiry into the subjects enumerated above will have to be conducted for the most part by means of analysis in the Laboratory. I beg to record below my remarks with regard to each of the above heads of enquiry:—

No. 1.—This may be taken up. Like the Rothamstead experiments, the enquiry, if continued for a sufficiently long time, may yield interesting information, although of little practical value. The enquiry may be conducted at one place only.

No. 2.—The enquiry into the character of different types of soils may lead to useful results. I have a suspicion that the laterite soils of Chota Nagpur and Western Burdwan, and soils derived therefrom, are deficient in phosphoric acid, several experiments having shown that they

readily respond to the action of bones, whereas the clay alluvial soils of Bengal and Bihar do not appear to derive any benefit therefrom. It may be useful to enquire why bones fail to act on the latter class of soils, whether the failure is due to the stiffness of the soils, to their richness in phosphoric acid, or to the excessive presence of lime. I would recommend that all the distinct types of soils in Bengal be subjected to analysis. It would be necessary to have several specimens of each kind analysed in order to admit of accurate conclusions being drawn. In making a study of soils, it is desirable to take up one province at a time, and complete the enquiry so far as that province is concerned, before taking up another. It is not absolutely certain that the mere analysis of a large number of soils will lead to any direct practical results. In many cases chemical analysis in the Laboratory may require to be supplemented by analysis with the help of crops on the system advocated by M. Georges Ville.

Nos. 3 and 4.—These enquiries are sure to lead to very interesting information, although not of directly practical value. It has been discovered in recent years that a certain order of plants (the *Papillonaceæ* sub-order of the natural order *Leguminosæ*) are capable of absorbing atmospheric nitrogen through the medium of a species of microbes living in small nodules formed on the roots of those plants. This discovery has made it intelligible why pulse crops are so useful to grow in rotation with cereals, and why leguminous crops are almost invariably resorted to not only in India but also in other countries for purposes of green manuring. I have examined numerous papillonaceous plants, among others, *dhanche* (*Sesbania aculeata*) and *arhar* (*Cajanus indicus*), and have invariably found nodules on their roots. They were specially abundant on the roots of some *dhanche* plants I examined. It is probably due to this cause that *dhanche* is looked upon as an excellent restorative crop in Bengal. The subject of the absorption of nitrogen by plants deserves a thorough enquiry, but the enquiry may be confined to only one locality, preferably where the Laboratory will be situated.

No. 5.—This subject does not much concern Bengal. The extent of *usar* in Bihar is very limited.

No. 6.—The comparative merits of canal and well water for irrigation have afforded much matter for dispute in Bengal as well as in the Upper Provinces. Please see the report of the Commission appointed to enquire into the working of the Sone Canals. It is alleged by raiyats in South Bihar that the Sone water is injurious to soil; why, they or anybody else cannot as yet say. Some suppose it is cold,—that is, as compared with well water;* others allege that it contains a proportion of fine impalpable matter which settles in this soil and clogs its pores. All these points remain to be settled by scientific enquiry. Again, as far as my study of the literature of canal irrigation goes, it has never been demonstrated that canal water applied in the same quantity and with the same care and scrupulous economy is as beneficial as well water, although very frequently its actual inferiority is explained by the extravagant manner in which it is used by the cultivators. The Bengal Government might request Dr. Leather to take up the enquiry above suggested.

* Dr. Voelcker on page 77 of his Report says that in none of the investigations has a single record been given of the actual temperature of either canal or well water. This is, however, not so, as Mr. Scott in his "Manual of Opium Husbandry" has recorded certain results of experiments made by him as to relative warmth of well and canal water (*vide* the Hon'ble Rai Jai Prakas Lal's dissent in volume I of the Sone Canals Commission's Report).

No. 7.—Composition of existing and new manures.—Numerous experiments are made in our farms with different manures, like cattle-dung, crude saltpetre, etc., of which the composition is extremely variable. Statements like this, for example, that a given amount of cattle-dung is a better manure than a given quantity of crude saltpetre for a particular crop, have little meaning, unless the composition of either is known. One sample of dung may be twice as valuable as the other, its actual value as manure depending upon the food of the cattle and the method of conservation of the manure. It may be desirable to have samples of all manures used in comparative experiments analysed, so that their true chemical value may be known. This would, however, involve too much work for the Agricultural Chemist and his assistant. Only selected samples may be, therefore, analysed. The compositions of many manures like bone dust and various kinds of oil-cake are pretty uniform, and a few analyses may suffice to yield all the information about them.

No. 8.—The enquiry on the subject of conservation of manure is very important; it can be prosecuted by the Agricultural Chemist at his head-quarters. The methods of conservation of dung followed in different farms may be tested by having samples analysed from time to time. In the Sibpur and Dumraon Farms we endeavour to save every ounce of excrements, solid as well as liquid; they are mixed with as much refuse straw as is available, and the mixed mass is kept in pucka pits, where it is mixed up from time to time and then trodden firm with the feet. It is desirable to ascertain by analysis whether, and to what extent, manure so made is superior to the ordinary cattle-dung.

Nos. 9 and 10.—Composition of food products and fodder crops.—This work may be left entirely to Dr. Leather and his assistant, and all that Provincial Departments may be called on to do is to supply them with typical samples of every kind of food product and fodder crop that they may call for.

No. 11.—This subject opens up a very wide field of investigation, and has been gone over by many eminent chemists in Europe. If, however, it is decided to take up this subject for enquiry, I would suggest that attention should be first drawn to a study of the variations in the percentages of crystallizable sugar undergone by different varieties of sugarcane in different periods of growth. I have often found a man accusing the raiyat of cutting canes when

Analysis of soils, water, manure, etc. (Mr. Basu)—contd.

they are either too raw or too ripe, with the result of a diminished outturn, but I have never found any one defining the symptoms which show the proper stage of maturity. An enquiry into this subject may lead to much practical good. It may be also useful to ascertain the difference in respect of grain sugar between samples of jaggery prepared in shallow iron and deep earthen pans.

No. 12.—Enquiries in connection with the cultivation and manufacture of indigo, tea, and coffee should not, as Dr. Voelcker says, be ordinarily undertaken by the Agricultural Chemist. These industries are in the hands of wealthy and influential people, who can well afford to engage chemists on their own account. The cultivation of tobacco offers a useful field of enquiry. Why Indian tobacco is generally defective in burning quality; whether the fault can be remedied by suitable manuring—*e.g.*, with potash manures—are questions which may well be included in the scope of enquiry of the Agricultural Chemist.

2. In Bengal we have done practically nothing in the way of having soils, water, manure, etc., analysed. Mr. D. B. Allen, when in charge of the Dumraon farms, had some samples of soil analysed by Mr. Kinch of Cirencester. Beyond these, very few analyses have been made either at the instance of Government or private individuals. I hear Mr. Bamber, who was employed for two or three years by the Agri-Horticultural Society of India and the Tea Planters' Association in enquiring into the cultivation and manufacture of tea, has made some analyses of tea soils, but his report does not appear to have been yet published.

3. We should have much liked to have a Provincial Laboratory in Bengal. Dr. Leather and his assistant will be hardly able to cope with the work thrown on them. The Bengal Cirencester scholars had a good training in analytical work, and it is said that their knowledge in this particular was not in the least utilized. One of them, Mr. G. C. Bose, showed himself so proficient in analytical chemistry, that Professor Kinch had him elected as a Fellow of the Chemical Society. A small Laboratory might be very advantageously established in connection with the Sibpur Farm.

4. It is necessary to lay down some definite lines of enquiry, which the Agricultural Chemist may be called upon to take up in the beginning. He should not be required to take up any new line of investigation until one or more of the subjects previously prescribed have been thoroughly investigated.

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(14)

Note by Mr. B. Ribbentrop, C.I.E., *Inspector-General of Forests to the Government of India, on the reboisement of the heads of destructive ravines.*

Reboisement of heads of destructive ravines (Mr. Ribbentrop).

1. In the discussions, which followed Captain Chapman's interesting account of the restoration of ravines, the correctness of the principle, that all such improvements must proceed from the head downwards, was unanimously acknowledged. This may be sufficient as regards ravines with a gentle incline and somewhat removed from the hills; but when the periphery of the ravines to be dealt with includes head-waters situated in mountainous or hilly ground, it is necessary that the barrage work should be accompanied and even preceded by an afforestation of the higher portions and the steeper slopes, the denudation of which is the main cause of the existence of ravines and torrents. Without such afforestation the works of reclamation result in a constant and frequently ineffective struggle against nature, a fact which has been fully recognised in France, which, of all European countries has, during the last 30 years, taken the lead in reclamation works of this kind, and which is consequently able to show the best practical results.

2. The magnitude of the works carried out in that country can be gauged by the note appended to the introduction of E. Thierry's "Restauration des Montagnes, comition des torrents, reboissment;" when it will be seen that, from 1861 to 1888, 144,000 hectares were treated at a cost of 51,670,000 francs.

3. The French literature on the subject is very complete as regards the subject in question, and I would strongly recommend the study of the book above quoted, and of the work of Alexander Surell, "Etude sur les torrents."

4. The whole of the introduction of Thierry's book should be read, but I would draw special attention to the paragraph on page 9, which runs as follows:—

Voici l'ordre qui généralement a été suivi pour l'exécution des travaux :
1° Tracé des *périmètres* des terrains à reboiser ou à maintenir boisés;
2° Reboisement des parties stables;
3° Fixation des terrains instables, en commençant par les ravins et en terminant par la branche principale des torrents;
4° Reboisement des terrains instables au fur et à mesure de la fixation des torrents et ravins, sans laquelle l'instabilité des parties voisines était incurable.

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Note on Agricultural Education prepared by Sir E. Buck, *Secretary to the Government of India, Department, Revenue and Agriculture, in connection with the Home Department's quinquennial review of Education in India.*

Agricultural education (Sir E. Buck).

1. Agriculture, as the occupation of a large majority of the people of India, deserves separate and special consideration. A system of teaching which will tend to make an agriculturist

intelligent and capable of assimilating new ideas is, in the present stage of educational progress in India, more required than actual instruction in anything like agricultural science. There is, in fact, greater need for such reforms in the general educational system as will make it suitable for an agricultural people than for agricultural colleges of a high standard. Mere literary training does not lead towards the end in view. Agriculturists, above all others, require to be taught how to observe and how to draw inferences from observation; to receive in fact instruction of a practical character. *Agricultural education (Sir E. Buck)—contd.*

2. It is not, however, necessary or even expedient that a practical education should in the earlier stages of instruction be technical. The charge was laid against the educational system formerly prevailing in the rural schools of England that it actually unfitted the children of farmers for an agricultural career. Nevertheless, wrote Mr. Jenkins, the author of the second Report published by the Royal Commission on technical instruction, there need be nothing in any scheme of rural education specially designed for the agricultural classes which should unfit the children for any other career for which individually they may be better suited. The Government of India hold the same view. The education of the eye and the hand simultaneously with the instruction of the mind is the basis of all technical training, and is not less required for other trades than for those pursuits in which agriculture is involved.

3. In the preface to the Syllabus adopted by the Educational Department for rural schools in France, it is laid down that teachers should commence by directing the attention of pupils to visible and tangible objects which they should make the children see and feel, and thus put them face to face with concrete realities from an intelligent comprehension of which they will be led, by a gradual exercise of their reasoning faculties, to the formation of abstract ideas. And in the Report of the Royal Commission already quoted, it is urged that rural education should be based on what a child can see round him. These principles, if accepted, lead to the inevitable conclusion that any system of practical education, for whatever class of children, whether agricultural or not, it is intended, must in rural schools acquire an agricultural colouring simply because the surrounding objects are themselves agricultural.

4. The same argument applies to the maps, lesson sheets, and reading books employed in a course of elementary instruction suitable for village schools. These should all deal with subjects familiar to the pupils. It is advised, indeed, by some of the best educational authorities in Europe that instruction in the interpretation of maps should be commenced by teaching children how to understand the map first of the school premises; next of the group of houses in the neighbourhood of the school or of their own dwellings; and then those of the estates by which they are surrounded. In almost every province of India such maps are readily procurable. So, too, pictorial lesson charts should illustrate objects such as plants and insects destructive to them which can be found in the neighbouring fields.* Again, reading primers should contain lessons descriptive of subjects which are not merely familiar to the pupil but likely to be of practical interest to him in later life. The diseases to which cattle are liable; the connection between epidemics and want of sanitary precautions; the advantage of using brood mares in the plough; the elementary facts of botanical science;—such subjects as these can be made quite as interesting as incidents taken from foreign history or European life such as have too often constituted the main contents of many of the reading books in use.

5. In some Provinces, *e.g.*, the Central Provinces, steps have been taken in this direction. It must, however, be remembered that the ultimate objects at which the education of an agriculturist aims are not all of them directly connected with the tillage of the soil. It is of importance to every cultivator that he should be able to understand and interpret the meaning of entries in a cadastral map; that he should have a proper acquaintance with the system of rural accounts; and that he should be able to read and comprehend the land-records maintained by the official staff. For these purposes he should receive instruction in drawing, arithmetic, and such simple surveying and mensuration as can be easily taught to any boy. It is equally desirable to bear in mind both that the objects enumerated in the preceding paragraph are often of as much importance to those who, though not actually tillers of the soil, are likely in after-life to hold any interest in land as to those who cultivate it, and that instruction in the direction indicated is as useful for general purposes of education as any other kind of teaching. It is perhaps even more useful. And the opportunity may be taken to draw attention to the circumstance that drawing, which on other grounds is now acknowledged as an essential element in every sound educational course, is of special importance in connection with agricultural and indeed any technical training, not only as an introduction to survey and map-reading, but also as a guide to the comprehension of the diagrams and illustrations contained in the technical works which it will be necessary for any student who may ultimately seek a more complete education in agricultural or other special science to consult.

6. The next point to consider is that in order to qualify teachers in village schools to give a practical turn to rural education, they must be themselves properly taught how to accomplish this object.

7. The Government of India have elsewhere accorded their approval to the views which were expressed on this subject at the Agricultural Conference held at Delhi in 1888, when it was urged that the measure most immediately demanded was that of educating teachers. Whether this should be effected by mere reforms in the curriculum of the higher schools and colleges or by

* Exemplar charts of this kind have already been prepared in the Imperial Department of Revenue and Agriculture and can be supplied on requisition to any officials who may require them either as models or for use in schools.

Agricultural education (Sir E. Buck)—contd.

the establishment of normal schools for instruction is a question which may be left for the consideration of Provincial Governments and Educational Departments. In the 23rd paragraph of the Resolution issued by the Government of India in the Home Department in 1888, a recommendation was made that Committees should be formed for the discussion of questions connected with technical education, and it is suggested that a Committee with which the Agricultural Department should be associated should in each province be formed at an early date for the special purpose of considering what reforms should be effected in the system of rural education with the view of rendering it of the greatest possible service to the rural classes without affecting its utility to children who are likely to follow other than a purely agricultural avocation.

8. The subject of a technical and scientific training of an advanced character in agriculture must be considered an entirely separate one. It is questionable whether the time has yet come to offer, except to a very limited extent, a high-class agricultural education to any section of the people. The special conditions of soils and climate in India as affecting agriculture are not yet sufficiently investigated to admit of authoritative instruction in agricultural practices and reforms. Measures have been taken, both by the Imperial and Provincial Governments, to institute systematic enquiry and experiment in connection with agriculture under the guidance and direction of competent experts, and while these are proceeding, perhaps for many years to come, it would seem preferable to prepare the agricultural classes to be able to assimilate and receive such technical instruction as may at some future time be afforded to them, rather than to establish agricultural colleges on any European model, or upon a prematurely ambitious scale. It was properly urged in the note * on Agricultural Education, published under the authority of the Madras Government, that the first step necessary in the direction of agricultural improvement was the "ascertainment of possibilities." The second was to raise the intellectual level of the agricultural classes sufficiently to enable them to adopt such "possibilities" as might be discovered by scientific investigation. Both processes are necessary, though the one is independent of the other, and both require a considerable period for their accomplishment. But until both have reached an advanced stage, it is doubtful whether any widespread improvement in Indian agriculture of a satisfactory character can be expected, or whether expenditure on educational institutions of a high standard will be of much practical use.

* By Mr. F. A. Nicholson, Collector of the Salem District.

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(16)

Agricultural education (Mr. Middleton).

Note on Agricultural Education by MR. T. H. MIDDLETON, *Professor of Agriculture, Baroda College.*

1. At the Conference held here in 1890, the general question of agricultural education was very fully discussed, and I think that at the present meeting it would be advisable to lay down the policy which should be adopted in the introduction of agricultural instruction into Indian schools and colleges. In doing so, I do not think that we should attempt to provide for the wants of the cultivating classes only, for even were it practicable to limit our education to them alone, which it is not, it would be unwise to do so for obvious reasons, some of which have just been alluded to by our President. In India, as in France, agriculture should occupy a prominent place in the system of national education, and although it must be many years before we can have here the highly perfect educational machinery which they have in that country, I may perhaps now be permitted to indicate the nature of the programme which I think might be advantageously adopted in laying the foundations of a similar system of education in India.

2. Briefly, my ideas on the subject are, *first*, that we should have a limited amount of higher education at institutions in which the teachers would be engaged more in experimental work than in the class-room; *second*, that as soon as possible teachers should be trained and text-books prepared for primary schools, and when some progress had been made in this direction that, *third*, we should take up the question of secondary agricultural education in high schools, etc.

3. In a memorandum addressed by me to His Highness the Gaekwar on the subject of agricultural research stations, copies of which have been circulated to some of the members of the Conference, I have tried to show that sound agricultural teaching must in India be preceded by research; for the conditions under which agriculture is carried on in this country are so very unlike those of Europe, that the material which agricultural teachers there find provided for them is of comparatively little value to us here. Satisfactory research can best be carried on by a staff partly European and partly Native, and the first work of a teacher brought from Europe should be to train assistants who will help him in acquiring an accurate knowledge of the principles of Indian agriculture.

4. As a teacher, I would like my materials and subject-matter to be as perfect as possible before introducing them to the Indian student. To begin with, I would like most time to be given to experimental enquiry, and I do not think that we should push higher education further than is absolutely necessary in the meantime.

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5. There are two reasons for which in the interests of education itself, higher instruction should not be made cheap and common at the beginning. They are: (1) That the Indian teacher is not yet able to give the pointed practical illustrations of principles which confer much of the value on the agricultural lectures given in Europe, and partly it is for this reason that the common Indian Agricultural student has not that practical knowledge (or rather I should say that practical turn of mind, for no student can have much practical knowledge) which is desirable. (2) That we have, as a rule, an unsympathetic public to deal with. The answers given to the questions of the Madras Agricultural Committee showed in many cases that those who sent in replies mistook entirely the province and nature of teaching. Disappointment was expressed because Saidapet students were not able immediately upon leaving college to improve upon the local agricultural practices; and it was frequently pointed out that the graduates of that college (graduates be it remarked who were engaged in pursuits having little or nothing to do with farming) were not practical men. The task of the agricultural teacher would be less difficult if the public could be made to understand that lectures, text-books and college education generally cannot give a student experience, and that the teacher's object is to train his students in such a way that they may know how to set about the getting of experience for themselves, but this the public will not do; as in Madras, they will continue to entertain unreasonable expectations, and for this reason, I as an agricultural teacher would prefer, as I have said above, that our colleges and our students should be few for the present.

6. But the majority of the members of the Conference are anxious to obtain some agricultural training for Revenue and other officers, and for this reason it may be necessary to make higher education more popular than I personally should desire. I have said above that the agricultural education which we can now give will be much less perfect than that which the future will enable us to offer, but I think that even now our agricultural colleges at Saidapet, Poona and Baroda are able to turn out students who for Revenue work have had a training more practically useful than that given during the B. A. course. This opinion is shared by others—*vide* the remarks of Dr. Cooke on page 48 of the Proceedings of the Conference of 1890. If Government desires to have men so trained it is only necessary to offer a few appointments, in which the prospects are fair, in order to secure any number of candidates.

7. Having established central institutions for higher instruction, the next step should consist in introducing agriculture into primary schools. This could be done gradually in each province, beginning with the district in which the cultivators were most advanced, for it would be in such districts that the children of the cultivating classes would be in greatest proportion in the higher standards of the schools. The training for the school teachers would have to be provided at primary normal schools, each of which would require an efficient agricultural teacher and a farm. In the beginning, and in those provinces where there are colleges, the normal school should be near the higher institution, and the same farm might with advantage be used for both. To begin with, the primary school teachers would only be employed in explaining the lessons contained in the agricultural readers prepared under the orders of the Departments of Agriculture and Education in each province, but a forward move would soon be possible. A few years would show which of the primary school teachers possessed most aptitude for the work, and these might be encouraged to attend short extra courses of instruction chiefly of a practical character, at the Presidency farm. Successful men would be given certificates and would be appointed to those vernacular schools which teach up to the highest standard. In these better-class schools, after having passed through Standard IV, the course of study might with advantage bifurcate,—those boys who required a literary training taking one line, those who meant to take up agriculture another. A system of the foregoing kind exists in the "superior primary schools" of France. When once established in the most forward districts of a province, primary education could be gradually extended to other districts, as the spread of the agricultural classes in normal schools became possible.

8. We come last to middle class or secondary education which in our circumstances presents the greatest difficulties. From the boy at the primary school not very much is expected, and a certain amount of useful knowledge for him may be easily embodied in text-books, and I should hope be successfully explained by the class of teacher just referred to. Students in colleges, on the other hand, are few in number, and can be provided with good teachers, who would be to a great extent independent of text-books, their own notes and the aptitude of the pupils making up for the deficiency. If, however, we are to introduce agriculture into our middle class schools, we must not only have very good text-books, but a considerable number of well-trained and practical teachers. The former have still to be written and the latter to be trained. Whenever they are available we might begin to introduce a good agricultural course into high schools, and the extension would, as in other cases, come with time. There are at present agricultural classes attached to several of the high schools of Bombay, but the students learn next to nothing of Indian agriculture. They are as a matter of fact taught about English agriculture from text-books written for England, and the results are anything but satisfactory. If we attempt to teach agriculture in high schools, it should be of a purely Indian and chiefly of a provincial character: the students should learn thoroughly about local agriculture; comparative agriculture, as it is sometimes called, is beyond the ordinary high school boy. Provided a high school had a good farm and a good agricultural teacher, I should like to see a course of study provided from the fifth standard upwards for boys who had not the means nor the wish to go up to the University, but who intended to appear for what we in Bombay call the school final certificate. This course would embrace, instead of Euclid, Algebra and ancient languages, such subjects as

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Agriculture, Surveying and Measuring, Botany and Physical Geography, and would be intended for boys entering the lower grades of the public service. In addition to the more special agricultural teaching at high schools, advantage might be taken of the farm and teacher to give a few lessons on agricultural subjects to all school-boys above a certain age.

9. In the case of both colleges and primary schools agricultural instruction should, as Dr. Voelcker says, find a place in existing institutions. As regards middle class schools, I will not attempt to pass an opinion. The question is, will the middle class education given in connection with high schools be sufficient for the wants of the country? This question is one which each province must answer for itself.

10. In Bombay we have two colleges, in Madras there is one, but other provinces are unsupplied, and in these at least it would, I think, be found necessary to establish agricultural schools like that at Nagpur, in which Revenue Inspectors and other District Officers might be trained.

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Address on Agricultural Education delivered at the Industrial Conference at Poona on Monday, the 4th September 1893, by MR. G. V. JOSHI, *Secretary to the Poona Industrial Conference, and laid before the Agricultural Conference by* MR. E. C. OZANNE, *Survey Commissioner and Director of Land Records and Agriculture, Bombay.*

"Knowledge is Power."

Agricultural education (Mr. Joshi).

1. Agriculture is no longer what it once was—rude, rustic husbandry, a simple manual mechanical operation, an empirical pursuit. All over Europe and America, it is now regarded as an industrial art of a highly complex and difficult nature, requiring for its successful prosecution an application of several sciences. Agriculture takes its rank "as a scientific occupation," and it is deemed essential that the farmer, quite as much as the surgeon and the engineer, should receive proper instruction in his work; and his efficiency is measured, as is that of every other industrial worker, by his ability to get the largest return with the smallest expenditure of time, labour, and material resource. And agricultural education, as is now understood, in the advanced countries of Europe, includes a systematic course of technical instruction in the theory and practice of agriculture, thus regarded as an industrial art, and embraces in its range a wide sweep of varied scientific knowledge in its manifold practical applications to the cultivation of the soil.

2. In all countries and at all stages of progress, such education, when evenly and widely diffused among the rural classes, must be of incalculable benefit to the progress and improvement of agriculture. For in this, as in every other field of productive industry, science and science-guided skill are in these days indispensable requisites of practical success, as tending to the maximum economy of effort and material means. And the trained farmer, with his trained eye and hands and the moral resourcefulness which his training gives him, will do his work infinitely better than one left to the guidance of his untutored mind and crude experience.

3. But in agriculture, even more than in any other industry, is the help of scientific knowledge and training indispensable. For it is in one sense an exceptional industry which, unlike every other, is subject to the economic law of *diminishing returns*. As J. S. Mill remarks (*vide* P. E., ch. XII), "After a certain and not very advanced stage in the progress of agriculture, it is the law of production from the land that in any given state of agricultural skill and knowledge, by increasing the labour, the produce is not increased in an equal degree; doubling the labour does not double the produce; or, to express the same thing in other words, every increase of produce is obtained by a more than proportional increase in the application of labour to the land." With the help of science and scientific education, it is always desirable to endeavour to minimise this inevitable waste of energy involved in this pursuit.

4. In countries where there are limitless reaches of virgin soil at command, agricultural education, however useful and desirable *per se*, is not deemed absolutely necessary. The need of scientific methods of agriculture is not felt, increase in production to meet the requirements of a growing population being easily secured by extension of cultivation to fresh areas. In the United States, Canada and Australia, the effort is rather to get out of the land the maximum return it can yield in proportion to the labour employed, and additional labour and resource are carried elsewhere. Here scientific farming is unnecessary, and is considered too costly a method, and simple fallowing is the easy restorative means adopted.

5. But in old and populous countries, where cultivation at a comparatively early stage reaches its limits of expansion, and tends, with the advancing needs of an advancing population, to become—in the normal course of progress—more and more *intensive*, applied science is required to help in the change, and agricultural training becomes an economic necessity. In most European countries such a change from *extensive* to *intensive* agriculture has taken place within the last fifty or sixty years, and one of the most powerful means, by which the change has been carried out, has been a wide diffusion, under a carefully planned and graded system of agricultural education and through a skilfully constructed and wide-branching machinery, of sound scientific agricultural knowledge among all classes of rural society.

6. In India there is an industrial dead-lock of a most severe and formidable type. Agriculture is with us the one sheet-anchor of our economic life, the one staple industry, to which we trust to meet the wants of our growing numbers, to provide for an expanding export, and to pay for the growing charges of a progressive administration. And yet no industry could be in a worse plight. The limits of agricultural extension have long since been, in most Provinces, reached and even overstepped, and, notwithstanding, evidence is accumulating as to *positive agricultural deterioration* all over the country, notably in the North-Western Provinces and Oudh, in Madras and in our own Presidency. The exhaustion of the soil under an exhausting system of cultivation is fast proceeding and the agricultural outturn per acre is on an average even less than 12 bushels—a measure of yield about the lowest by comparison (*vide* marginal table) in all the world; and now even the food-supply of the country is in serious danger! The industry continues in its old grooves and the ryot is left to struggle as best he may in his helpless ignorance, no effort being made to call to his aid the resources of science and scientific training. Surely this is not as it should be. The situation is full of peril and, as the Famine Commissioners write, it is "essential that technical knowledge should be called in to enable the productive powers of the soil to be applied in the most effective manner, not merely to add to the wealth of the country, but to secure a good supply which shall keep pace with the increase of population." Thus a comprehensive scheme of agricultural education intended to raise the general plan of rural intelligence and agricultural work is, with us, not a mere educational desideratum, but an imperative economic necessity, an indispensable help to agricultural improvement, which we can no longer afford, under penalty of chronic famines and disaster, to neglect.

Country.	Bushels per acre.
United Kingdom	30
France	20
Germany	18
Belgium and Holland	26
Italy	15
Russia	16
Europe	15·5
India	11·5

7. Under these circumstances it is satisfactory to observe that the situation and its requirements find such general recognition. Government acknowledges, in the fullest manner, its obligations in the matter of providing agricultural education for the landed classes, and practical measures are being organized in most Provinces. And what is still more encouraging, even the landed classes themselves are coming forward to help the movement,—*e.g.*, the Talukdars of Oudh and the landed gentry of Gujerat.

8. Clearly, it is most important that the new efforts should proceed on lines shown by experience to be good and safe, and the question for consideration is what should be our working plan in our new departure? A well-defined programme is essential, otherwise there would be waste of energy and the risk of eventual failure.

9. We will begin with a brief survey of the European systems of agricultural education as described in the Royal Commission's Report on Technical Education.

10. It is necessary to premise that in these European countries the entire fabric of industrial instruction—agricultural and other—rests on the solid foundation of a widespread primary education, which is general and in some cases even compulsory by law. A strong substantial basis of general education and knowledge is thus ensured, on which special instruction in the arts and sciences proceeds along varied lines in well-ordered sequence. In France, in Germany, in Denmark, in Belgium, in Holland,—in each of these countries there is a complete and elaborate system of agricultural education, constructed on the basis of an advanced course of elementary instruction. Well-equipped institutions are provided for every grade and class of agricultural workers, from the small tenants and farm-labourers to the large landed proprietors. The instruction imparted is varied and adapted to the varying requirements of the different landed classes. Practice is more or less combined with science, and specially in Germany even general education is continued alongside of technical in all the lower stages of the specialized agricultural course. Almost invariably each one of these institutions has a farm or a garden plot attached to it for purposes of experimental demonstration or illustration. The special education is highly prized and eagerly sought after, and trained pupils of these agricultural institutes readily find employment as farm bailiffs, managers and superintendents, or, in the case of the higher landed classes, return to their own estates and carry out agricultural improvements. It is remarkable that, in most countries, these institutions owe their origin to the State initiative, and are largely maintained by the aid of State subventions. Of these, the French system is, by general consent, the best and the most advanced; and as it seems to offer to us a suitable model for imitation, a fuller account of it might not be deemed out of place.

11. In France primary education is universal and compulsory by statute, and in all primary schools instruction in agriculture is given after the lower elementary stage is reached as an optional *special* side. On this basis rests the entire system of special education in the country. The agricultural institutions, as at present organized, are of three grades—*higher, intermediate,* and *lower*—and range themselves as under:—

French Institutions.

1 Institut National Agronomique.
3 Regional Schools of Agriculture.
9 Practical Schools of Agriculture.
2 Shepherds' Schools.
23 Farm Schools.

Agricultural education (Mr. Joshi)—contd.

1 School of Horticulture at Versailles.
4 Small Schools of Horticulture.
23 Agronomic Stations.
55 Departmental Professors of Agriculture

12. Of these, the *Institut National Agronomique* is the highest agricultural institute in France, intended to impart the most finished course of instruction in the specialized department of agriculture. The admission test is high—a science degree or its equivalent. The course extends over two to three years, and is a most elaborate one. Besides mechanics, general and agricultural chemistry, geology, zoology, physiology, botany, etc., the curriculum includes, among the subjects taught, agricultural technology, comparative agriculture, administrative law, and rural legislation. The plan of instruction embraces, besides theoretical instruction in the advanced sciences, practical exercises in farm work, laboratory practice, agricultural discussions, and excursions for observation and study.

13. The pupils number about 120, and pay a fee of £12 a year. The State grant for the institute is £10,000, and two travelling scholarships are awarded every year to the first two successful candidates who pass the final tests, to encourage a study of the agricultural systems of foreign countries. As to the status of the pupils, one-half of them are sons of landowners intending to farm their own properties, and the other half is composed of young men whose future callings may be thus epitomized :—

(1) Officers of the Government Department of Agriculture.
(2) Professors of agriculture in the departments and at the regional schools, directors of farm schools, etc. There are about 100 such places in France.
(3) Directors of agricultural experimental stations and agricultural laboratories.
(4) Directors of sugar manufactories, distilleries, etc.
(5) Agricultural engineers.
(6) Large tenant-farmers, or managers of agricultural companies in Algeria, etc.

14. Next come the *regional* schools—"one for a certain number of departments forming an agricultural region." The courses of study have special reference to the agriculture and agricultural requirements of the several agricultural "regions." These schools are secondary institutions, each with a large experimental farm, designed for young men who are sons of proprietors and farmers and others who desire to devote themselves to agricultural pursuits. Those who pass the final test receive a diploma from the Minister of Agriculture. The diploma is highly valued, and the passed men readily obtain good situations. These schools are maintained by the State. The regional school of Grignon is the best, with a roll of about 100 scholars, the annual charge coming up to £15,000 paid by the State. These regional schools are very popular and are of special interest, as being placed in direct touch with the agricultural life of their respective "regions."

15. Next in the scale we have the *practical schools of agriculture*, founded for the sons of well-to-do small farmers. The cost is borne partly by the Central Government and partly by the local departments. The instruction given is thoroughly practical, with only a small admixture of theory, and is in several schools combined with general education. The agricultural course varies according to the diverse cultural conditions of the several districts, and the subjects include agriculture and rural economy, the breeding, management and feeding of cattle, measurement and levelling, agricultural book-keeping, construction and use of agricultural machinery, and rural law.

16. Lastly, as forming the substructure of the edifice, we have a large number of farm schools for the benefit of the small farmers and farm-labourers. The pupils are termed "apprentices;" and are bound to work on the farms for 2 to 3 years. In each school the number of apprentices admitted varies with the size of the farm; the apprentices are lodged and boarded at the expense of the State, which pays £10-16-0 a year for each apprentice, including medical attendance. The design of the farm-school is authoritatively laid down, the farm giving the apprentices the best professional education and serving as a model to the whole district, as a profitable example of cultivation, while the "director in his school has to explain the most important operations to his pupils in the most simple manner, both practically and theoretically." The object of the farm-school is to train good cultivators and not men of science. These schools are all State institutions. The successful apprentices get certificates and small presents of money. They go back to their fathers' farms or proceed to superior agricultural schools, or obtain situations as farm-bailiffs or foremen on large farms; they are eagerly sought for on holdings where high farming is practised and improved machines are used.

17. Besides these there are numerous special schools of horticulture, forestry, cheese-making, etc., and we have also various normal schools for the training of agricultural teachers.

18. Finally, the whole organization of agricultural education is supplemented by the appointment of Travelling Departmental Professors of Agriculture. The salaries of these professors range from £120 to £180 per annum—all paid by the State. These professors are assigned a most interesting function in the general scheme Besides teaching in the normal schools, they go about the districts delivering lectures on practical agriculture in the different communes of their several departments to the teachers and agriculturists of the "regions;" discussions follow; and an exchange of views and experiences takes place. The following citations from

the Minister of Agriculture's (M. Tirard's) instructions to these professors will be read with interest:— *Agricultural education (Mr. Joshi)—contd.*

"Your mission is to keep the cultivators informed respecting modern discoveries and new inventions of economical and advantageous application, so as to let them be ignorant of nothing which it is to their advantage to know, but to lead them forward in the general movement of progress in which they participate to so small an extent owing to their isolation. You will have to instruct them as to what reforms they may introduce in the processes of cultivation, in the selection and feeding of animals. You will also call their attention to the preparation of manures, their utilizations, the way in which to increase their quantity by making use of fertilizing materials which are too often lost in the country districts. You will show to them the advantages which arise from a good choice of seeds, and of the varieties of plants cultivated, and more particularly how to extirpate weeds which take the place of useful plants, how to combat parasites of all kinds which ravage the crops, etc., etc. You will develop in them the love of progress and that spirit of initiative which causes them not to expect all from circumstances, or in due time, but from their own efforts. You will take care to cite as examples the results obtained by enlightened cultivators who employ good methods. You should, in short, exert yourself to describe in each locality what agriculture ought to be, and, after examination, you should indicate what should be done. It is in confining yourself to practical improvements, to operations which have been tested, and which have an immediate interest, that you will be enabled to gain the confidence of the cultivators and attain the desired end. In addressing cultivators and practical men who have the knowledge for themselves which tradition gives—that is to say, the slow and patient observation of facts from generation to generation—you should dwell only upon well-known truths and principles clearly proved by science. You will lay before them, therefore, only well-established facts, and you will limit yourself to the recommendation of improvements sanctioned by experience. It is also your business to secure the co-operation of agriculturists and agricultural associations, in order to organize them, and to stimulate thus the taste for practical trials and tests."

19. Such is briefly the teaching machinery in France for specialized instruction in agriculture. The Central Institut National Agronomique of Paris, the regional schools, the departmental practical schools, and the communal farm schools—these institutions, each complete in its equipment and strong in its teaching and controlling staff, provide a varied and graded training both theoretical and practical for every class of young men who desire to follow agricultural pursuits; and the departmental professors help to continue the course of instruction for the adult agriculturists, carrying it to their farms and homesteads in the communes and constitute a most interesting intermediate agency, connecting, in an unbroken line of continuity, the agricultural teaching of the schools and institutes and the agricultural life of rural France. The central aim of the organization is not only to supply sound and systematic training for the farmers, but also to maintain the entire agricultural system of the country on a high plane of efficiency and always in real, living touch with the general scientific and industrial advance of the times. No expense is grudged, no effort spared, to make farming as *scientific and intensive* as possible, and the marvellous progress of French agriculture during the last 20 to 30 years bears eloquent testimony to the beneficial influence exercised by these schools and institutes on the general course of the industry.

20. Coming to India, the first thing that painfully strikes the observer is the utter inadequacy of the existing provision for primary education. According to recent returns, the number of towns and villages in British India, excluding Upper Burma, is 575,458; while the total number of educational institutions, both public and private, is 138,[illegible], so that the percentage of schools to number of towns and villages is 23·9, and 437,431 towns and villages in British territory (76·1 per cent.) are still absolutely without educational facilities of any kind! So, again the total number of scholars is 3,682,767, of whom 3,368,930 are boys and 313,777 girls. The children of school-going age, taken at 15 per cent. of the total population of the country, number over 33 millions, and we have barely 10 per cent. of the number at school. This means that close on 30 millions and more of our young children are at this moment growing up in ignorance—30 millions of our rising generation condemned by our defective organization of primary education to be brought up in darkness, and the mental servitude and the moral helplessness it implies and involves. What a waste—an appalling moral waste of talent and opportunity is here! As the Hon. Mr. Nolan, Secretary to the Government of Bengal, truly observes, "The fact is that the cultivators are illiterate and their children are growing up in ignorance, the exceptions being so rare and isolated as to be of no account for agricultural purposes. Now, if there is one principle on which modern statesmen in all countries are agreed, it is that popular education is the only means by which the condition of the masses can be permanently raised; and this truth has a special application to India, where these illiterate labourers are left to accomplish without superior guidance the great economic task of the country." This is a grave state of things, and every strenuous endeavour ought to be made to alter it. A large and substantial increase in the number of primary schools in all the Provinces is most urgently called for as a necessary foundation, without which any comprehensive scheme of specialized industrial education for the masses is a practical impossibility; and we would most earnestly join with Dr. Voelcker and the Simla Committee in pressing upon the attention of Government the paramount importance of extending primary education all over the country.

21. Passing next to the existing arrangements for agricultural education, it is clear that in no Provinces have we yet got very far beyond the first preliminary beginnings of a practical

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endeavour. In *Bengal* an Agricultural Primer is taught in the village schools, but no special institutions for the teaching of agriculture as yet exist. In the *N.-W. Provinces and Oudh*, a school of agriculture has just been established at Lucknow with a two years' curriculum divided into junior and senior, and including, among other subjects, the elements of agricultural chemistry, botany, and surveying. The admission test is the Middle English or Matriculation Standard, and the object of the school is to afford elementary practical agricultural instruction to (1) Kánungos and other revenue employés or candidates for revenue employment; (2) persons wishing to obtain agricultural certificates or diplomas, which might enable them to obtain posts as agricultural teachers or managers of experimental farms; (3) landowners and others wishing to learn something of the theory and the rational practices of agriculture for application to the management of their own properties. In the *Central Provinces*, as in Bengal, an Agricultural Primer is read in the village schools, and we have, besides, a good school of agriculture at Nagpur with a normal class composed of Vernacular teachers—two from each district. The course of study comprises agriculture, surveying, chemistry, botany, geology, elementary veterinary science, and drawing. The instruction is thoroughly practical in the field and laboratory.

22. To ensure that the students acquire a practical knowledge of agriculture, plots of land are allotted to them, which they are required to cultivate with their own hands. They are permitted to keep the produce. The students also maintain a labour journal and cultivation book for the experiments conducted on the experimental farm.

23. A small veterinary dispensary is attached to the class for practical instruction in the treatment of more common forms of cattle disease. There was also a travelling lecturer some time ago, but the place seems now to have been unfortunately abolished. In *Madras* we have an excellent Agricultural College at Saidapet founded in 1865, but it is yet an isolated institution without feeders and without much connection with the general scheme of Vernacular education in the Presidency. The instruction imparted is of a superior type, embracing a wide range of subjects. Agriculture is an optional subject for the Public Service Examinations, but owing, it is said, "to want of teachers, it is taught in very few schools, and even in them the instruction given is far from satisfactory." In our own Presidency there is no separate special machinery; but the Poona and Baroda Colleges have each a strong agricultural section organised under a special European Professor; and 8 agricultural classes attached to 8 High Schools in the mofussil. The University grants a diploma in agriculture to the successful pupils of the colleges, and the curriculum provides for a three years' course and comprises a wide range of subjects, among others, agriculture, botany, geology, chemistry, qualitative analysis, surveying, veterinary pathology, etc. The programme of studies for the High School agricultural classes is an elementary one and extends over two years; and agriculture is also an optional subject for the U. S. F. test recognised by the University. Little, however, is yet done to reach the cultivating classes through the village schools. The *Panjab* is about the only Province which is absolutely without means of imparting agricultural instruction of any kind.

24. Such are our existing arrangements. Larger developments are under contemplation in most Provinces, notably in Madras. In *Bengal* it is proposed to organize a strong Agricultural College at Seebpore, and measures are being adopted for introducing elementary instruction into the primary schools. In the *Central Provinces* the plan is to introduce a systematic course of agricultural training into the more important Vernacular schools of all the 18 Districts or Tahsils. In *Madras* a much broader scheme is under the consideration of the Local Government. There is already an admirable college at Saidapet, where superior instruction is given, and the Local Administration proposes to establish five farm schools, apparently on the French plan, in five representative districts, as feeders to the central college. Government further contemplates, in course of time, an agricultural school in each of the 21 Districts of the Presidency. Altogether the Madras scheme appears to us to be a comprehensive one.

25. With this hurried survey of the European system and the arrangements in India, existing and contemplated, for the education of the rural classes in agriculture, we would proceed to state briefly our own ideas on this important subject, confining our view to our own Presidency. The points for consideration are, among others, chiefly these—

(1) What sort of special agricultural instruction is required?
(2) For what classes is such instruction desired?
(3) The question of the teaching agency. What existing institutions, if any, can be utilized for the purpose by modification or enlargement? And what new special institutions are needed?
(4) The curricula of studies.
(5) The question of management and control.
(6) The question of funds.
(7) Any special measures for the encouragement of the new studies.

26. On the first point, we would at once say that we want and desire a well-graded system of agricultural education complete in all its branches of higher, intermediate, and lower, as is contemplated in the Madras scheme. Technical instruction should be, as in the French systems, arranged on a thorough combination of *practice* with *science*; for, as Dr. Thaer, the founder of systematic agricultural education in Germany, would say, "agriculture cannot be learnt entirely by attending lectures delivered from the professorial chair." Besides, the

special course ought not to begin except on a broad basis of general education and culture ensured by adequate entrance tests, without which, and the logical, disciplined tone and habit of mind it gives, specialized instruction does not well succeed; and even in the pursuit of special studies we would desire that attention should be given as much to their disciplinary as to their scientific and technical value. *Agricultural education (Mr. Joshi)—contd.*

27. Next as to the classes for which such training is desired, they may be grouped as under:—

(1) The large landed proprietors—the holders of Inams and Jagirs, the Talukdars, the Khots, the large Watandars, the Mehewasi holders, the Jamindars, etc.
(2) Large capitalist farmers, whose holdings average between 100 to 500 acres.
(3) The small landholders with holdings of 25 to 100 acres.
(4) The smaller tenant-farmers in easy circumstances, etc.
(5) Non-landowning classes—those who may wish to enter into agricultural pursuits, or who may wish to qualify themselves for posts of managers and superintendents on large estates, or, again, to go into the Revenue or Survey Departments of the public service, etc.

28. The following tables are appended as showing the status and position of our landed classes:—

TABLE A

Tenure.	No. of estates.	No. of villages.	No. of holders and share-holders.	Gross areas in acres.
Rayatwari	1,292,126	21,245	1,292,126	29,770,078
Inams and Jahagirs	2,220	2,220	10,386	4,224,259
Talukdari	530	530	493	1,719,502
Mehewasi	62	62	93	120,402
Udhad Jamabandi	504	504	6,652	841,752
Khoti	1677	1,677	48,736	2,173,350
Izafat	7	7	13	3,609

TABLE B.

	Government.	Inam.	Total Number.
Under and up to 5 acres	279,677	88,758	368,435
5 to 25 acres	494 602	86,942	581,544
25 to 100 „	268,966	32,778	301,754
100 to 500 „	30,904	5,386	36,300
And over 500 acres	1,449	622	2,071

29. On the question of machinery, Dr. Voelcker is strongly "in favour of attaching institutions for agricultural education to existing educational institutions in preference to isolating them," and Dr Cooke thinks "that this is the best and most economical method of securing to students the benefits of general as well as special education, as well as continuity in the system of instruction." And indeed the Simla Conference, agreeing with these distinguished Professors, deprecates the creation of special colleges and schools of agriculture. With all due deference, we venture entirely to dissent from this view and hold with the Madras Government that separate special institutions are absolutely necessary for specialized instruction, and that any attempt to graft on the general educational scheme such instruction, particularly in its higher branches, is doomed to failure and disappointment, there being always present the risk of the special studies being shadowed over and relegated to a secondary position in the general system. European experience supports this contention, and both the Madras and Bengal schemes contemplate an elaborate special machinery for the purpose. Accordingly we would also venture to recommend a similar special teaching agency for this Presidency. We would have—

(*a*) *A Central Agricultural Institute*, to be located in Poona, as distinct and separate from the College of Science, organized on the plan of the celebrated Paris Institute Agronomique or the Berlin High School of Agriculture, well equipped and under a European (French or German) Specialist as Principal, assisted by a strong staff of qualified lecturers. The existing agricultural classes of the Poona College of Science to be transferred to the proposed Institute; the three years' course as at present arranged, leading up to the final test for the University Diploma, to be widened by the inclusion of (among other subjects) *comparative agriculture, agricultural technology, administrative law* and *land legislation*; the Institute to have a museum and a laboratory and an experimental farm as part of its necessary equipment; and finally the admission test to be sufficiently high to ensure an adequate basis of general culture. (We would not go below the U. S. F. or the Matriculation Standard, and would have by preference P. E. as the lowest test.) The Institute would

Agricultural education (Mr. Joshi)—contd.

impart the highest type of instruction in scientific agriculture and would be mainly for sons of the large landed proprietors and science graduates and undergraduates of the University wishing to qualify themselves for higher appointments in the Revenue and Survey Departments and the Department of Agriculture,

(*b*) Next, we would have five *Divisional Schools of Agriculture* corresponding to the "regional" schools of France or the Agricultural Institutes of Prussia on the plan of "representative" district farm schools contemplated in the Madras scheme, but of a superior type. Our districts naturally fall into five groups, each with a distinctive and well-defined set of climate and cultural conditions, *viz.*, Sindh, Gujerat, Konkan, Deccan, and Carnatic; and we would propose that each of these divisions should have a superior school of agriculture located in a representative district. These divisional schools should be under competent native agricultural graduates as Head Masters, to be assisted each by a staff of four to five special lecturers. The entrance test to be the 2nd grade P. S. certificate as the minimum, the curriculum to be a sufficiently broad one, corresponding to the 1st and 2nd year courses of the Central Institute, and to comprise, besides the usual professional subjects, *comparative agriculture and land tenures;* the instruction imparted to be thoroughly practical and to have a special relation to the agricultural conditions and wants of the Divisions in which the schools are located, and excursions for observation and study to form an integral part of the course; each school to have a *model, not an experimental, farm,* intended for experimental illustration, exhibiting results of practices and processes shown by experiment to be advantageous, and the farm to be a model of successful cultivation to the whole Division. These schools are intended for sons of the large landed proprietors who might return to their ancestral estates and carry out agricultural improvements, as well as for other young men desiring to qualify themselves for posts in the Agricultural, Revenue or Survey Departments, or as managers of estates, and they will be either as feeders to the Central Institute or independent agricultural institutions, giving certificates of efficiency to their successful pupils at the termination of the course. We would also suggest that these divisional schools should have each a *normal class,* on the model of the one we have at Nagpur, to be composed of Vernacular teachers, say one from each Taluka, who, after they get certificates, might return to their schools and would form a valuable agency for the introduction of agricultural instruction into the village schools.

(*c*) We would further have *agricultural classes* in all the High Schools of the Presidency—8 already existing. These classes to continue as at present teaching pupils for the U. S. F. course and also for the Central Institute and the Divisional schools. These classes further to have each a model farm where "apprentices," sons of poor farmers and labourers, might also be admitted for agricultural instructions; these apprentices to be stipendiary students (as till lately at Sholapore) and bound to work on the farms. The course of instruction for these apprentices to be as simple, elementary and practical as possible; the farms to be models of good and careful cultivation to the whole neighbourhood. The farm-schools so arranged under High School agricultural teachers, would correspond to the Departmental farm schools of France, and be our District schools, such as are proposed for the districts in the Madras Presidency.

(*d*) We would at once introduce elementary instruction in agriculture into our village schools, an agricultural primer such as is taught in Bengal or the Central Provinces being read as a compulsory text-book. This would form a solid groundwork for the upper specialized courses.

(*e*) Finally, we would earnestly recommend, as part of this teaching machinery, the appointment of *travelling agricultural lecturers,* corresponding to the Departmental professors of agriculture in France or the *wander-lehrer* of Germany, whose duty it would be to travel about the districts and deliver lectures to the assemblies of adult cultivators convened specially for the purpose in their own villages and under their own village headmen; elucidate to them in the most simple way and in their own homely idiom the more important principles of practical agriculture with direct reference to the features and conditions of the local farming; and suggest improvements in practices and processes and implements shown by experiment or found by experience advantageous elsewhere. These travelling lecturers should be certificated men of the Central Institute, who have gone through a systematic course of training and selected for their special practical knowledge, and should work under the immediate professional direction and control of the Director of Agriculture. They would also serve as advisers in agricultural matters to the district officers. Two for each "agricultural" division, or ten in all, would be enough for a practical beginning; the salaries should be sufficiently high, say, ranging from R150 to R200, to attract competent men for the posts. Altogether, to our thinking, these travelling lecturers would fulfil a most useful and important function in the general scheme of

agricultural education. They would form an admirable and effective agency—perhaps the only one that could be devised in our present condition of primary education—through which to reach the cultivating classes in the villages, disseminate among them sounder notions of practical agriculture, and, awakening their intelligent interest, enlist their active co-operation in the cause of agricultural improvement. *Agricultural education (Mr. Joshi)*—contd.

30. Such, briefly, is the machinery, and such are the institutions, we would recommend for the agricultural education of our rural classes. These institutions are—

(1) A *Central Agricultural Institute* to be located in Poona under a European Principal.

(2) *Five Divisional Schools of Agriculture* for the five agricultural divisions of the Presidency, each to be located in a representative district and with a Normal class for the training of Taluka Vernacular teachers.

(3) *District High School classes and farm schools for apprentices* in all the districts of the Presidency.

(4) *Elementary agricultural instruction* in the primary schools; and

(5) *Ten travelling agricultural lecturers*—two for each Division.

31. With the exception of the Principal of the Central Institute and a few specialist professors who would have to be brought out from Europe, the requisite supply of teaching power for the proposed institutions could be easily obtained from the Poona, Baroda or Saidapet College, or the Nagpur Agricultural Class. There would be surely no lack of competent men for the work if sufficient attractions were held out. As for text-books, there would be some difficulty, and suitable hand-books would have to be specially prepared in the Translation Branch of the Educational Department for the purpose as they are required.

32. As to the question of *management and control*. All the institutions we have proposed should, we think, be under the administrative control of the Director of Public Instruction, as constituting an integral part of the general machinery of State education. In all professional matters relating to studies, lectures, text-books, tests, etc., we would have the Department of Agriculture exercise a directive supervision over them. At the local centres, besides, it would, in our opinion, be desirable to have small Boards composed of Revenue officials and non-official representative farmers, constituted and associated with the management of these institutions. The travelling agricultural lecturers would, of course, work, as stated before, under the immediate orders of the Director of Agriculture as do the Departmental professors in France under the Minister of Agriculture.

33. Lastly we come to the *vexata quæstio* of funds. The total charge of the machinery proposed would be, as far as we are at present able to estimate, about R1,00,000 at the most and on a liberal scale, or about ⅛ per cent. on the total land-revenue collections of the Presidency (R3,60,00,000), distributed as below:—

	Per mensem.	Cost per annum.
	R	R
The Central Institute		26,400
The Principal	1,000	
The staff	1,000	
Other expenses	200	
The 5 Divisional schools of agriculture costing R500 each per mensem		30,000
The 23 District schools and classes costing R100 each per mensem		27,600
The travelling lecturers, R125, including pay and travelling allowance, each		15,000
Scholarships, prizes, etc.		2,000
TOTAL		1,01,000

34. The National Institute Agronomique, Paris, alone receives from the Central Government in France an annual grant of Fr. 251,450 (=£10,058, or over a lakh and a half). The small kingdom of Denmark devotes about £11,000 (=R1,76,000) to the support of agricultural education. The additional expenditure, therefore, of a lakh of rupees or so per annum proposed for Bombay, with her vast agricultural interests, in support of agricultural education, may not be deemed too large or extravagant.

35. How is the new charge to be met? On this point we have two distinct suggestions to offer—

The total Provincial contribution to Local Funds by way of compensation for the loss sustained in consequence of the abolition of the one anna cess on abkari revenue is, as at present fixed, R1,55,068. The *excise revenue* of the Presidency comes up now to over 104 lacs net, on which the one-anna cess would amount to about R6,50,000,—*i.e.*, nearly four times the present grant. In fairness and equity we submit that the grant should at least be doubled, and our suggestion is that the increase thus accruing to local resources might be utilised partly in aid of primary education and partly for the provision of agricultural instruction.

Agricultural education (Mr. Joshi)—contd.

Secondly, we would venture to suggest that the time is now come for considering whether the Local Boards might not be authorised, by amendment of the existing statutes, to spend half of the local cess proceeds instead of one-third, as at present, on the extension of primary education for the masses. Roads and bridges, dharmashalas and kacheris, are, no doubt, most desirable things in themselves, but we have spent on these works of public convenience and utility very large amounts during past years, and it behoves us now to consider whether part of this expenditure might not be advantageously diverted to the extension of educational facilities for the people. General and technical education—it cannot be too often repeated—is essential to the well-being of the masses, even more so than the facilities of communication, and there is force and justice in the demand that every effort should be made to raise the poorer classes of the country "intellectually to the moderate level insisted on in regard to the humblest inhabitant of every civilised country."

36. Should these two suggestions meet with favourable consideration, the financial difficulty can be easily got over and the scheme of agricultural education, as above outlined, might be launched out at once.

37. As for young men for the agricultural institutions; no doubt much difficulty would be experienced at the start in attracting students to the new courses. The field is a new and untried field, and special inducements would have to be offered, at least at the initial stages. The machinery of scholarships, rewards, and prizes would have to be employed, and we would also suggest, by way of special encouragement and in order that the scheme might receive a fair trial, that two or three high-class appointments (worth, say, R150 to R200) in the Revenue, Survey or Education Department, might be guaranteed to the successful students of the Central Institute, and two or three more in the subordinate branches of the public service set apart for the certificated men of the Divisional schools of agriculture. In the faculty of Civil Engineering, Government has given special encouragement to graduates of the University by the guarantee of certain appointments in the Public Works Department; and we know what a powerful attraction these guaranteed places have been to students of superior calibre and attainments. A similar privilege, if conceded to diplomaed men of the agricultural institute and certificated men of the agricultural schools, would assure their future in a way in which nothing else could. In course of time, as knowledge and enlightenment spread among the masses and the value of professional training comes to be seen, a fine field would open out before the trained men of these institutes. We have in our Presidency no fewer than 65,801 superior landholders—including Inamdars, Khots, Talukdars—besides many capitalist farmers, and there are close on 40,000 superior holdings, 36,300 averaging 100 to 500 acres, and 2,000 of over 500 acres in extent. And as agricultural education is more and more appreciated as a help to agricultural improvements, these trained men of the agricultural schools would be in great demand, and several would employ their professional knowledge for the improvement of their own properties and holdings. But this is a work of time, and in the meanwhile extraneous and artificial aids and inducements would be necessary to put the system into fair working order.

38. Such is our scheme, which we think might also be found suitable for the other Provinces of India. It is, no doubt, a large and comprehensive scheme, but we are convinced that no limited or restricted plans would meet the requirements of the case. The pressure of the economic position is severe—increasingly so,—and it does not seem to us to be in any view desirable that energy and funds should be frittered away on half measures and makeshift arrangements, which could yield no solid or lasting advantage. Let us make the effort; if an effort is to be made at all, on an adequate scale. The situation demands it, and considerations of future economic safety give emphasis to the demand.

39. The expenditure required would be a rather large addition to the Educational Budget of the Presidency. But looking to the magnitude of the interest at stake,—looking to the fact that now even the food supply of the people is imperilled and famines with starvation and suffering and an industrial paralysis in their train are threatening to be chronic in the land—the cost of the measures intended to bring some help and relief ought not to be deemed prohibitive. It should be cheerfully met and borne, whatever it may come to, if only for the sake of the future, even if necessary by resort to special taxation. There is also the Famine Insurance Fund, on which we might reasonably make a demand for this purpose.

40. The scheme is put forward in the confident hope that if properly given effect to it would be a lasting blessing to the country. Of course, we do not expect impossibilities; we are well aware that other measures of an equally comprehensive character, including a permanent limitation and settlement of the State demand upon the land, so as to bring into effective play the magic sense of property, which "turns sand into gold," are required to restore the agricultural industry and life of the country to its healthy and normal tone. But education and the diffusion of technical scientific knowledge among the masses would have their effect, and would exercise a most salutary—revivifying and reinvigorating—influence on the entire economic life of the people. The Indian ryot with all his faults and shortcomings—and they are not few—is not the blind, obstinately conservative industrial worker he is painted to be. He is shrewd, keen-sighted and intelligent, always open to reason and argument, and ever ready to welcome light and new ideas, from whatever quarter they might come. He works in his old ways and sticks so lovingly and passionately to his own traditional methods, for he is yet untaught to understand and appreciate other and better ones. Let him be, for once, brought under the liberalising influences of education and knowledge, and no industrial worker could surpass him in boldness of initiative or vigour of enterprise. Education, wherever it has been tried, has

proved one of the most effective helps to moral, intellectual, and industrial upheaval and progress, and we submit there is nothing in the conditions of this country or in the national character and habits of its people to forbid the hope and anticipation that it would serve a similar end in India and work an analogous revolution. *Agricultural education (Mr. Joshi)*—contd.

41. The scheme of agricultural education sketched out in the foregoing pages is submitted with great diffidence and as a tentative scheme, and whatever may be thought of its merits as a practical working plan, we feel sure that the educational problem, as regards the rural classes of the country, will receive the most careful consideration at the hands of the Conference; and we would content ourselves with observing that while the life-blood of the country is slowly ebbing away—the penalty of ignorance and mental degradation—the question of effective relief and cure with the aid of knowledge, Heaven's Light, may no longer be put aside. Our duty in this matter is a most solemn and sacred duty; and let us do it bravely, resolutely and cheerfully, come what might, and

> "Learn, even in the darkest hour,
> To trust the Almighty's care;
> His eye beholds, His hand protects—
> Oh, who would then despair!"

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(18)

Note on Agricultural Education prepared by MR. A. C. TUTE, *Collector of Dinajpur, Bengal, and laid before the Conference by* MR. W. C. MACPHERSON, *Director of Land Records and Agriculture, Bengal.*

1. Few will dispute the main conclusion arrived at by Dr. Voelcker that our present system of education directly discourages anything like a study of agriculture. *Agriculture education (Mr. Tute).*

2. It will also be clear to any one who has lived in the mufassal, as I have now for 22 years, that the one direction in which we can move with benefit to the country is improving and developing its natural resources.

3. The experiment of fostering every ideal thing has been tried for the last ten or fifteen years in Bengal. Boys have been taught everything under the sun save one, and that is to use the materials the Almighty has given them to the best advantage. We have tried to satisfy the cravings of a limited class of men for political power. We are all of us aware of the amount of real good that has been done to the country. Even in the jails we have taught peasants trades and industries which, even if they had the inclination, they have not the means of pursuing after their release.

4. We seem to have neglected the one thing needful, and that is, teaching people to make the best of the natural resources of the country.

5. I have been asked by the Director of Agriculture in Bengal to furnish him with a note on the subject of agricultural education, and I gladly take the opportunity of giving my views for what they are worth on a subject which a constant mufassal service has rendered of paramount interest to me—the improvement of the resources of the country. We must start with two assumptions. They may seem unkind, but they are true. One is that the Bengali Babu will not take up any line of country from which he cannot see some near personal gain. By the Bengali Babu I mean the population under education at all schools above the rank of the village patshala, in which the 3 R's alone are taught. The next is that the ordinary peasant views with distrust any new thing. At the same time when he sees by demonstration that a real gain can be had by the adoption of some simple method, he is eager to take it up. The popularity which has followed the introduction of the sugarcane crushing mills in this most backward district will illustrate my statement. How to combat these two drawbacks to the spread of agricultural education must be the first object in any scheme for the furtherance of the spread of that education. I have taken the line rightly adopted by Dr. Voelcker that we must begin simultaneously working from above downwards and from below upwards—from the student in the higher schools downwards: from the peasant who follows the plough upwards.

6. It is absolutely vain and idle to start anything like agriculture, whether theoretical or practical, in our schools and colleges as a voluntary or optional subject. I do not even think that the facility of obtaining a degree in agriculture, much as it would be prized, would in itself be enough to tempt those who go in for higher education to take up that subject. It would soon be known that a certain B.A. was but an agricultural B.A., and his value would be discounted amongst those who had taken their degree in the more cultivated subjects

7. Added to this there is a contempt for anything like farming ingrained in those who call themselves "the enlightened." Education has not developed the physical side of their nature, and they would no more go in for the practical farming that commends itself to the young men at home, who go in for hard work to learn farming, than they would dream of attempting mountaineering on the Himalayas, or taking long walking tours for the pleasures of exercise and of enjoying the scenery of Eastern Bengal.

8. To make the study of agriculture a possibility amongst these people, it must be a *sine quâ non* for the obtaining of a post. It must be made a compulsory subject in all competitive

Agricultural education (Mr. Tute)—contd.

examinations for the Subordinate Executive service, and for the executive branches of the Provincial services. The question is—Is this desirable? I have no hesitation in answering, yes.

9. The knowledge of the principles of agriculture is invaluable to those who enter Government service. They must necessarily be few in number. Where I see the great advantage of the compulsory study of agriculture is *to the hundreds who must needs fail in getting those appointments.*

10. What is the result of our present system? Some hundreds of young men yearly fail in the attempt to get Government service. The next thing they go for is the Bar. That in the mufassal is already overcrowded. They cannot take to medicine, for they have not the training. The career of an engineer, either in Government or private employ, is equally closed. No man can become an engineer without a long and careful practical training.

11. They fall back therefore on newspaper-writing, politics (save the mark!), and annually swell the ranks of a discontented class who have received a cheap education and find that it is of no practical use. The whole array of mukhtiars' touts, petition-writers, and cutcherry loafers is the direct result of a system of education which has given men a certain acquaintance with the history and language of a foreign country, and has utterly failed to show them how to develop the resources of their own.

12. Land is cheap enough in all conscience in many parts of Bengal, and were the study of agriculture raised and dignified by being made a compulsory subject for Government service, many a man who now takes up pursuits of a more or less questionable respectability, would turn farmer, and benefit himself and his neighbours by farming on the principles which he learnt at school and college.

13. I am not sufficiently versed in the subject to lay down any methods by which agriculture should be taught in these higher schools. One thing would, to my mind, do much to further the study of the subject, and that is, to make Dr. Voelcker's own report a prescribed text-book in English. The style is as good, if not better, than many of those which students now read, and the subject-matter is certainly more useful than that of almost any one of them. I have tried to show why I think the study of agriculture should be made compulsory amongst students. I now come to consider how in the immediate future we could extend the knowledge of sound agricultural principles amongst the masses of the people. My first proposition in this direction may seem rather startling.

14. Over the gates of Kilmainham Jail in Dublin is inscribed the legend "Cease to do evil; learn to do well." Now, however much jail discipline in Bengal may have made evil-doers to cease from evil practices, it has not taught them much in the practical art of doing well for themselves when they come out. There are, of course, some prisoners of the hardened criminal classes to whom jail must be made as distasteful as possible. There is, however, a considerable jail population who are in casually, through some temporary lapse from the path of rectitude. Most of these men come from the purely agricultural classes. What could be easier than having every jail garden a practical school of agriculture for such prisoners? A certain amount of task-work could be exacted daily from each man, and it seems to me that time would be better spent in showing a man, who had been brought up amidst agricultural surroundings, methods of carrying on his farming operations better than those to which he was accustomed, than in teaching the same man how to weave blankets or stoke an engine, as he is taught in the central jails, or breaking his spirit by the monotonous sound of the oil-mill or the dull tedium of the dhenki, as is done in the smaller prisons.

15. A man may learn to weave blankets in company with a number of others, but when he comes out of jail he would no more dream of carrying on the industry unless he were of weaver caste than he would for amusement call out, "Sirkar, sálaam as you was," to which we are all accustomed. It is supposed, but I believe erroneously, that teaching men work on machinery fits them for employment in the Calcutta mills. It may *fit* them; but Calcutta employers, like the generality of men, look with disfavour on taking released convicts into their employ.

16. Teaching agriculture in the jails to prisoners, to whom it is not absolutely necessary to make life as unpleasant as possible, is therefore one of the means of spreading a knowledge of agriculture which commends itself to me. The more so, as my experience shows me that once a raiyat has seen *in his own case* that a certain method will give him a larger outturn, he will readily adopt it. From another point of view, too, it would be good, for it would send a man back to his home with some valuable information acquired, which he could use for his own advantage, and without getting the cold shoulder from the world in his efforts to lead an honest life.

17. I am puzzled how to suggest the teaching of agriculture in patshalas just at first. The kindergarten system of practical object lessons seems to me the best, and I am going to start five schools on the path of agricultural learning. I have selected these schools, as being situated either in Wards' estates, or estates which have recently come from under Wards' management, the proprietors of which are enlightened, and will be ready to help me. It is but an experiment, and I cannot prophesy its result. There is one thing certain, and that is, that if agriculture once gets popularized in the higher schools, its finding its way to the patshalas is a matter of but little time. Dr. Voelcker has given us the results of his enquiries. It is

necessary that those results should be widely known if they are to be of any practical good to the Empire. *Agricultural education (Mr. Tute)*—contd.

18. To ensure this a thoroughly sound system of agricultural education is necessary. This is impossible unless Government gives the subject a prominence which it has never yet enjoyed. If but half the trouble and energy which have been devoted to fostering Local Self-Government in town were devoted to inculcating local self-help in the mufassal, we should, in a very short time, have the Province of Bengal one of the wealthiest agricultural countries in the world.

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(19)

Note by Mr. J. B. FULLER, *Commissioner of Settlements and Agriculture, Central Provinces, on the need of simplifying the language of village school text-books.*

The artificial vocabulary of vernacular school text-books must have struck everyone who has examined a village school in these provinces. Even the First Reader, for children who have just got on terms with the alphabet, contains words which are never used by the people and which require translation before the pupils (and sometimes before their examiners) can comprehend their meaning. I take for instance Lesson 16 of the First Hindi Reader in which simple words have in the following cases been rejected for uncommon words of foreign origin:— *Language of village school text-books (Mr. Fuller).*

Svapna for "dream" (sapna).
Varna for "caste" (jati).
Nyáya for "justice" (insáf).
Vastra for "clothes" (kapra).
Ahár for "food" (khana).
Avashya for "necessary" (zarur).
Sahasra for "thousand" (hazar).
Bhrama for "doubt" (sandeh).
Jiwadhári for "animal" (jánwar).
Shresht for "best" (sab se uttam).

The writer of this book himself appreciated the difficulty of many of the words and gives at the beginning of the Lesson equivalents for them in common speech.

2. I will now take as a sample of a more advanced text-book, the Hindi translation of the Agricultural Primer, and would observe to begin with that, as the primary object of this book is to instruct in elementary science and not in language, its vocabulary and style should be as simple as possible, and the translator should take as his model in this respect the admirable series of English Science Primers written by Huxley, Geikie, and others But as a matter of fact the translation is so interlarded with Sanskrit words and phrases as to be absolutely unintelligible to an ordinary agriculturist if read out to him. I will pass over the Introduction, which is not perhaps an easy passage to translate, and will begin with Lesson I. Now, I do not object to the word *krishividya* for "agriculture," as a somewhat technical term is required and we may go to Sanskrit for it. Similarly, *kala* may be accepted for "art," which is a word having (so far as I am aware) no equivalent in use. But I object to *niyam* for "rules" or "principles," *varnan* for "relate," *vishesh karke* for "especially," *sambandh* for "relation"—all in the very first sentence. Not one of these words is in ordinary use.

Going further I object to the use of *jantu* for "animal" (*janwar*), and again of "*jivdhari*" in this sense; of *praya* for "nearly," *vrikeh* for "tree," (*ke*) *dwara* "by means of," *swata* for "themselves" (ap se ap), *virudh* for "opposite," *navin* for "young," *tantu* for "hairs," *sadaiv* for "always," *tibe* for "quick," *gáti* for "motion," *bhakshya dravya* for "food" (khaneki chizen), *avashyak* for "necessary," *vastu* for "thing," *prarambh* for "beginning," *sidh* for "clear," *khadya* for "food," *asambhava* for "impossible."

Passing to Chapter II, amongst numerous instances of pedantic phraseology may be quoted:—

Sampurna for "whole."
Padartha for "substance."
Yatharth for "in reality."
Adbhut for "countless" (be-shumar).
Sukshma for "fine."
Yadi for "if."
Drishti for "sight."
(Ki) *Nai* for "like" (to).
Dinaru for "old."
Prani for "animal."

Now, the English words rendered as above are (with the possible exception of "substance"), all simple terms, and having simple equivalents in everyday use I am aware that the common language of the people is very deficient in abstract terms and that to translate such terms it may often be necessary to have recourse to the classical languages. [Perhaps the use of *gati* for "motion" may be justified on this ground.]

Language of village school text-books (Mr Fuller) —contd.

Similarly, the use of classical words may be justified in translating purely scientific terms, though I think that in most cases it is better to boldly introduce the English term as it stands: "oxygen" is no more difficult for the schoolboy than "pran rakshak vayu"—its school-book translation. But I can see no justification whatever for the introduction of strange equivalents for words in everyday use—in the substitution of *prani* for *janwar*, of *vastu* for *chiz*, of *avashyak* for *zarur*, and of *khadyg* for *khana*.

3. The introduction of Sanskrit words into our Hindi (and also into our Marathi and Uria) school-books is apparently due to a desire on the part of the writers to exclude as contraband every word which is not of purely Hindu origin. It is not only in our schools that this desire for purism has made its mark. It has affected the court language also For the familiar "Mudai" (plaintiff), "Mudaalai" (defendant), and "gowali" (witness) our summonses bear the outlandish equivalents of *badi*, *pratibadi*, and *sákshya*,—words which are absolutely strange to the people. There is no length to which these purists will not go. A ban has ever been placed on the familiar word for "if" (*agar*) which is replaced by the unused word *yadi*.

4. The subject is one on which I addressed the Administration of these Provinces some time ago, and the question of reforming the text-books is now under the Chief Commissioner's consideration. I wrote—

"In stating that words directly taken from Sanskrit are not understood by ordinary pupils, I of course exclude those who have learnt them at school. Such persons, having acquired a knowledge of them with difficulty, are by no means disposed to underrate them, and one of the main difficulties in dealing with this subject is to ascertain whether words which have a strange look in text-books are understood by the people or not. It is by no means easy to cross-examine an uneducated man on the subject, and educated men have generally passed through the mill of the Education Department, and of course understand these words and are proud of understanding them. The real test is to enquire whether such words are used in ordinary conversation. It will be found that they are not. No ordinary man in his senses would for instance use "yadi" for *if*, "arambha" for *beginning*, "yatho chit" for *jaisa chahiye*. I am aware that objectors will argue that there is in English a vast difference between spoken and written language. But I submit that such difference as there is amounts to nothing compared to which we find here. There is not a word in an ordinary English text-book which could not be used in conversation with perfect propriety and without the very least reproach of pedantry. The difference between written and spoken English is one of style and syntax, not of vocabulary.

"Now, if it is true (as I venture to maintain) that our Hindi text-books are so framed as to introduce our schoolboys to a new language of highly artificial origin, instead of improving them in the use of their own language, the position is one open to very obvious criticism. So far as books are meant to teach a knowledge of things their object is in great measure defeated. The days are gone by when Latin was employed as a vehicle for teaching the rules of Latin grammar, and it is now universally recognized that a book which is to convey a knowledge apart from scholarship should be written in the simplest style possible. Education in the present time is becoming more and more directed to the expansion of the intelligence as opposed to the mere cramming of knowledge. But how imperfectly must such an object be attained when the wording of our books requires special study in itself? We now teach elementary science—a subject foreign to the ordinary run of indigenous studies and hence requiring special lucidity of treatment. Yet our science text-books are so written as to be unintelligible save to one who has first acquired a knowledge of their language. It would be more reasonable to employ the language of Chaucer as a medium for teaching Geography in English schools.

"Moreover, from the literary side of the question there appear to arise numerous not less weighty objections. I write with all diffidence on such a question as this, but I have always understood that the development of the English language in its present form dates from the admittance of the 'vulgar tongue' to our schools, courts and churches.

"It appears to me that the use of an esoteric tongue—quite distinct from the language of everyday speech—as the medium of instruction must powerfully obstruct the literary progress of the people. There is of course no scope for eloquence in such a language, for eloquence is only awakened by an audience. Books written in such a language would appeal to a very small class; and indeed little could be looked for but educational works—keys, manuals, and the like. The language being artificial and pedantic would always remain divorced from the thoughts of the people, and in teaching it we are raising a barrier between thought and language which must be prejudicial to both."

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(20)

Note by MR. E. C. OZANNE, *Survey Commissioner and Director of Land Records and Agriculture, Bombay, on the progress of improved Dairying in Bombay and the necessity of improving Indian milk breeds.*

Improved Dairying (Mr. Ozanne).

In 1890 Dr. Voelcker formed an opinion (Report, page 216) that in dairying there is but limited scope for improvement, but he still thought that "scientific study of dairying" in India was called for.

In the former opinion at the time I concurred, but there is now evidence that the scope for improved dairying is very large and that the need for scientific study is much needed, and that this study should be extended in the direction of improving the milk breeds of cattle.

Improved dairying in the Bombay Presidency is now far beyond the experimental stage. The first steps towards improvement began four years ago, as narrated in Dr. Voelcker's Report, with the introduction of improved dairy machinery and appliances and through the practical tuition afforded by dairy experts employed by Government. The initiative example of the Agricultural Department has encouraged progress. The extent of the progress may be fairly gauged by the value of dairy machinery and appliances already sold in India. Up to date the sales by the agent of the Dairy Supply Company alone aggregate about two lakhs of rupees. The machinery sold consists chiefly of cream separators and butter-making appliances. Cheese-making so far has not proved successful. Excepting perhaps in the north of India, climatic conditions are all against it. Elsewhere even moderate success in

cheese-making can hardly be expected. At out-stations some trouble is still experienced in profitably disposing of separated milk. In towns there is now no such difficulty. *Improved Dairying (Mr. Oxanne).—contd.*

The wide extension of improved methods is largely due to private enterprise. During the last year, this extension has been greater than in any previous years. It is certain that the manufacture of good dairy products will increase. As far as this industry is concerned no further fostering help is required from Government in some localities. Further progress in the Bombay Presidency is assured because dairymen find improved methods much the most remunerative. It is not only the consumer and dairyman who are benefited : the milk producer also, even in remote districts, participates in the better prices. In out-stations, where separators have been introduced, milk has risen appreciably in value, and buffalo-cows kept for milk have much increased. The reason is that butter properly made and cream properly separated can be railed to those important centres where market rates are high. In India there is hardly a limit to the distance to which well-made fresh butter can be sent. And as regards cream, during twenty-four hours' transport it will be ripening, so that, at destination, it will be in good condition for conversion into butter.

The far-reaching benefits of improved dairying prepare the way for what to my mind is a much more important undertaking. I refer to Government action towards the improvement of the milk-breeds of India and systematic enquiry by expert Government officers into the economic rearing and feeding of milch-cattle. I think it is clearly the duty of the Conference to lay down a definite line of action along which enquiry by each Provincial Government should be made.

The question is of the greatest importance, and has probably as great a bearing on the future agricultural prosperity of the country as any question. Milk and the many products from milk are to a greater extent the food of the people than in any other country in the world. Yet in no other country are the milch-cattle so unsatisfactory as they are in India. How poor in quantity, not quality, the milk yield is of the average Indian buffalo or cow is difficult to estimate; but it can be judged of by the difficulty of getting a good milch animal and the price that has to be paid for one. In the Bombay Presidency proper, I know of no tract excepting the Gir in Kathiawar and parts of Gujrat where even moderately good milch cattle are bred. In Lower Sind there is a fine milch breed. It is likely to be maintained in its pristine purity, because owners exercise the greatest care in mating their best milk cows. Many Sind stock-owners know the pedigrees for generations of their best milk animals. Elsewhere a haphazard system of breeding prevails; and it is an incontrovertible fact that the cattle are generally poor milch cattle and that their capacity to yield milk is apparently getting poorer year by year.

If we look to the history of any renowned milk breed of other countries, we find that through the efforts of specially qualified experts it has been bred up to its present high standard of excellence. There are good grounds to hope that the better class of Indian milk-breeds can be similarly improved. We have here and there throughout the country a remnant left of good material to begin upon. The work cannot be left to stock-owners. "Breeding specially for milk" is beyond the knowledge of the ordinary cattle-breeder. He undoubtedly knows how to breed good work-cattle. There is no reason, however, why a deep milking cow should not produce male offspring calculated to grow into good draft animals.

Improvement must be initiated in Government dairy and stock farms. If these are worked to supply Commissariat Departments with milk for sick soldiers in hospital they ought to be self-supporting. Such farms will be popularized if the military authorities find, as they have already done, that they can therefrom obtain a purer supply of milk than from the *gwali*.

The establishment of Government dairy and stock farms would not only afford facilities for the primary object for which they would be instituted, *viz.*, the improvement of indigenous milk breeds of cattle, coincident with which would be the maintenance of milk registers and the systematic testing and analysis of milk, but would also afford the necessary opportunities for thoroughly investigating the comparative values of the numerous fodders and cattle foods which are in general use, but regarding the value of which we know next to nothing at present. Dairy farms would also form educational centres at which the more useful lessons to be taught would be the manipulation of dairy appliances and the practice of improved methods.

In breeding specially for milk, I think it is quite possible to improve our breed of buffaloes so that they become one of the best, if not the best, butter-producing breed of the world, and at the same time eliminate that irritableness of temper which is alike characteristic of most Indian breeds of cows and buffaloes, and which is all against free and full lactation. I think it is also possible that an unprofitable hereditary disposition to be irregular breeders may be in a like manner got rid of.

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(21)

Note by MR. J. WILSON, *Deputy Commissioner, Shahpur, Punjab, on the use of Wards' Estates in Agricultural enquiries.*

Wards' Estates in Agricultural enquiries (Mr. Wilson).

In Resolution of the Government of India, Revenue and Agricultural Department, No. 52G., dated 14th September 1887, paragraph 4, it is said that "much importance is attached

Wards' Estates in Agricultural enquiries (Mr. Wilson)—contd.

by Her Majesty's Secretary of State, as well as by His Excellency in Council, to the manner in which estates under Government management are administered, and to the use made of the opportunities afforded by them for ascertaining the economic condition of the agricultural population." In estates under the Court of Wards, which are scattered all over the country, and managed by establishments thoroughly under Government control, we have ready to our hand an excellent means of observing existing modes of agriculture, the outturn of different crops, and other agricultural facts, which it is difficult to ascertain with accuracy except by systematised and continuous observation.

For instance, every Settlement Officer who has had to work out estimates of produce, such as those on which the land-revenue assessment of many districts in the Panjab is based, must have felt that, owing to the want of a continuous system of observation on a sufficiently extensive scale, his estimates are, at the best, merely rough guesses. As regards the important factor of average outturn, they are generally founded on the results of observations made on small areas picked out here and there as representing average crops, checked by the very rough ideas agriculturists themselves have on the subject, and it is rarely possible to found them on trustworthy statistics of the actual outturn on large areas for a series of years. The need for such statistics is emphasized by the fact that it is a matter of common experience that observations conducted on small areas are apt to give too high results, and that the larger the area over which the observations are made, the smaller becomes the figure at which one is inclined to estimate the average outturn of a district or assessment circle.

As an example of the system I suggest, I may mention that in estimating the average produce of the Shahpur tahsil for purposes of assessment, I derived great assistance from the returns of the Natra estate which was under my own management as Court of Wards. As regards wheat on canal-irrigated lands, I found that the area harvested had, during the previous six years, varied from 2,195 to 4,032 acres, and the average outturn per acre from 5 to 11 maunds, the average for the six years being 7 maunds per acre on an average area of 2,923 acres. An average thus struck was obviously a much better basis for my estimates of average produce for the assessment circle than the statistics collected in the usual way by striking averages of the results of a number of observations on small areas of 2 acres or so, conducted in different places during three or four years.

What I would suggest is that the Director of Agriculture should be invited to lay down a system to be followed on all estates under Court of Wards, by which the areas under direct cultivation, or paying rent in kind by a share of the gross produce, should be carefully recorded with detail of soil and method of cultivation, together with the corresponding gross outturn of each kind of crop. These statistics should be tabulated year after year in such a form as would make it easy at any time to strike an average; and, say, every five years, averages might be struck and a note compiled by some one working under the Director's instructions showing the results of these observations and how far they might be taken as giving a true average of the outturn of different crops for the estate itself and for the whole tract in which it is situated.

Similarly, a system might be laid down under which the modes of cultivation practised on such estates, the amount and quality of the seed used, the quantity and kind of manure, the number of ploughings, waterings, etc., might be accurately recorded year after year for large areas. Observations thus continuously and systematically conducted would give us much more definite and accurate knowledge of existing agricultural practices than any number of desultory enquiries.

It will be noticed that in this note nothing by way of *experiment* is suggested, but only a systematised *observation* of existing practices and their results.

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(22)

Note by Mr. J. Wilson, *Deputy Commissioner, Shahpur, Punjab, on the introduction of Agriculture as a subject in Patwaris' Examinations.*

Agriculture in Patwaris examinations (Mr. Wilson).

In India, where such a large proportion of the pupils who attend the schools do so with the object of passing some examination which will qualify them for Government employment, the control of the development of education is in a familiar degree in the hands of the executive Government. All that it has to do is to prescribe the subjects in which candidates for the different posts are to be examined, and the whole system of education throughout the country will, following the law of demand and supply, speedily adjust itself to the requirements of the Government examinations. If, for instance, it is considered desirable that all grades of officials in the Revenue Branch of Administration should have a knowledge of agriculture, all that is necessary is that that subject should be given a prominent place in the examinations for all grades, and now that manuals of agriculture exist in most provinces, it would undoubtedly be a useful change if they were prescribed as subjects for all such examinations. More particularly, Dr. Voelcker's report on Indian Agriculture should be prescribed as a subject for all examinations for the post of tahsildar or any higher grade in the Revenue Branch.

As regards the post of putwari in the Punjab, the change could be very easily made. At present candidates for the post of putwari are examined in the three manuals, Arithmetic, Mensuration, Patwari and Kanungo Rules. There already is taught in most schools an excellent little manual on agriculture, giving a simple account of existing agricultural facts and processes, and this should be at once prescribed as a subject for examination. I should be

glad to see the examination made still more practical. Candidates might be made to yoke a pair of bullocks, plough and sow a field, work a well, and perform other agricultural operations with their own hands. Among other advantages this would help to serve men of the agricultural class for these posts, and would tend to disabuse the native mind of the prevalent idea that a man who can read and write is above labouring with his hands except as a mere scribe.

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(23)

Note by MR. J. WILSON, *Deputy Commissioner, Shahpur, Punjab, on the deputation of Junior Assistant Collectors for training in Agricultural work.*

The importance of training young civilians in a practical knowledge of agriculture was pointed out by the Famine Commission, who suggested that with this object Assistant Collectors might be allowed and encouraged to take up small farms and work them themselves. The difficulty is that Assistant Collectors are so frequently transferred from one district to another that it would be seldom that any one of them would hold the same farm for any length of time. Still the system would certainly help to give each Assistant Collector, who took advantage of it, some practical knowledge of agricultural processes and a greater interest in agriculture generally. I would suggest that, near the head-quarters of each district, a small farm of, say, twenty acres should be set apart for this purpose, and the Assistant Collector for the time being should be required to take charge of it and allowed to make what profit he can out of it, and, on his transfer, to dispose of the stock, etc., to his successor or to others on terms to be approved by the Commissioner of the division; the only condition being that he shall make careful observations on a system to be laid down by the Director of Agriculture, report the results, and present for inspection accurate accounts of his income and expenditure on the farm. To enable him to stock the farm in the first instance, a takkavi advance on the usual terms might be granted.

Each Assistant Collector should also, after he has been two years in the country, be required to select some particular crop or particular agricultural process as a subject of special study. He should be supplied with all available information on the subject, and should be given facilities for studying his special crop or process and making experiments with regard to it; and should be required to submit a note upon it every three years, embodying the results of his study. In short, each Assistant Collector, instead of having only a vague knowledge of agriculture generally, should be required to become a specialist as regards some particular branch of the subject.

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(24)

Note by MR. E. C. OZANNE, *Survey Commissioner and Director of Land Records and Agriculture, Bombay, on the present system of training Junior Civilians in Settlement in Bombay, and recommendations.*

Training of Junior Civilians in Agricultural work (Mr. Ozanne).

In Bombay junior civilians are required to show that they have studied the system of settlement in force by passing at the Higher Standard Examination, a special paper, set by the Survey Commissioner on survey and settlement matters, the questions being confined to matters dealt with in the prescribed text-books.

Further, under standing orders, civilians employed in the Revenue Department are given an opportunity to learn the system of measurement and land valuation (classification) by being placed for six weeks under an Assistant Superintendent of Survey in charge of a field party. But this instruction is not necessarily or generally insisted on before the Higher Standard has been passed, and the paper referred to above does not test the practical knowledge gained in the field.

Thus, the course of study is less than the three months thought desirable in the orders of the Government of India (Circular 51S. of 19th July 1883); and the training in the rudiments of surveying and settlement work is not made a condition in the departmental examination, as the opinion of that Government was that it should be. Yet it must be noted that the Circular referred to was addressed rather to other Governments than to Bombay.

Recommendations.

The training should precede the Higher Departmental Examination, and the paper should include questions on field work.

The course of study should be prolonged to three months, of which one month should be devoted to the study in the field of measurement and classification; one month should be devoted to the practical study of settlement; and one month allotted to a practical study of the duties of kanungos in the field.

The measurement and classification could be better studied if it is possible to collect the candidates in one place under a competent instructor, whose sole duty it should be to give the maximum amount and variety of instruction in the allotted time. Hitherto more attention has been paid to classing than to measuring; but now that the classification done by the